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Foreign Agricultural
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Number 235

The Soviet Livestock Sector

Performance and Prospects

Edward C. Cook

SEP 19 1987
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Abstract

Between 1965 and 1985, the Soviet livestock sector underwent a major modernization program. Increases in livestock production exceeded population growth during this period, but did not keep pace with growth in consumer demand. The costs of the modernization program were large. Capital productivity fell dramatically and labor productivity improved modestly. Beginning in 1982, the Soviets enacted a broad set of policies in an effort to improve livestock sector performance. As a result, livestock growth rates were higher and cost increases were smaller than in the previous 5 years. Further improvement is expected into the 1990's.

Keywords: Soviet Union, livestock production, costs of production, prices, consumer demand, policy, socialized sector, private-plot agriculture, feed.

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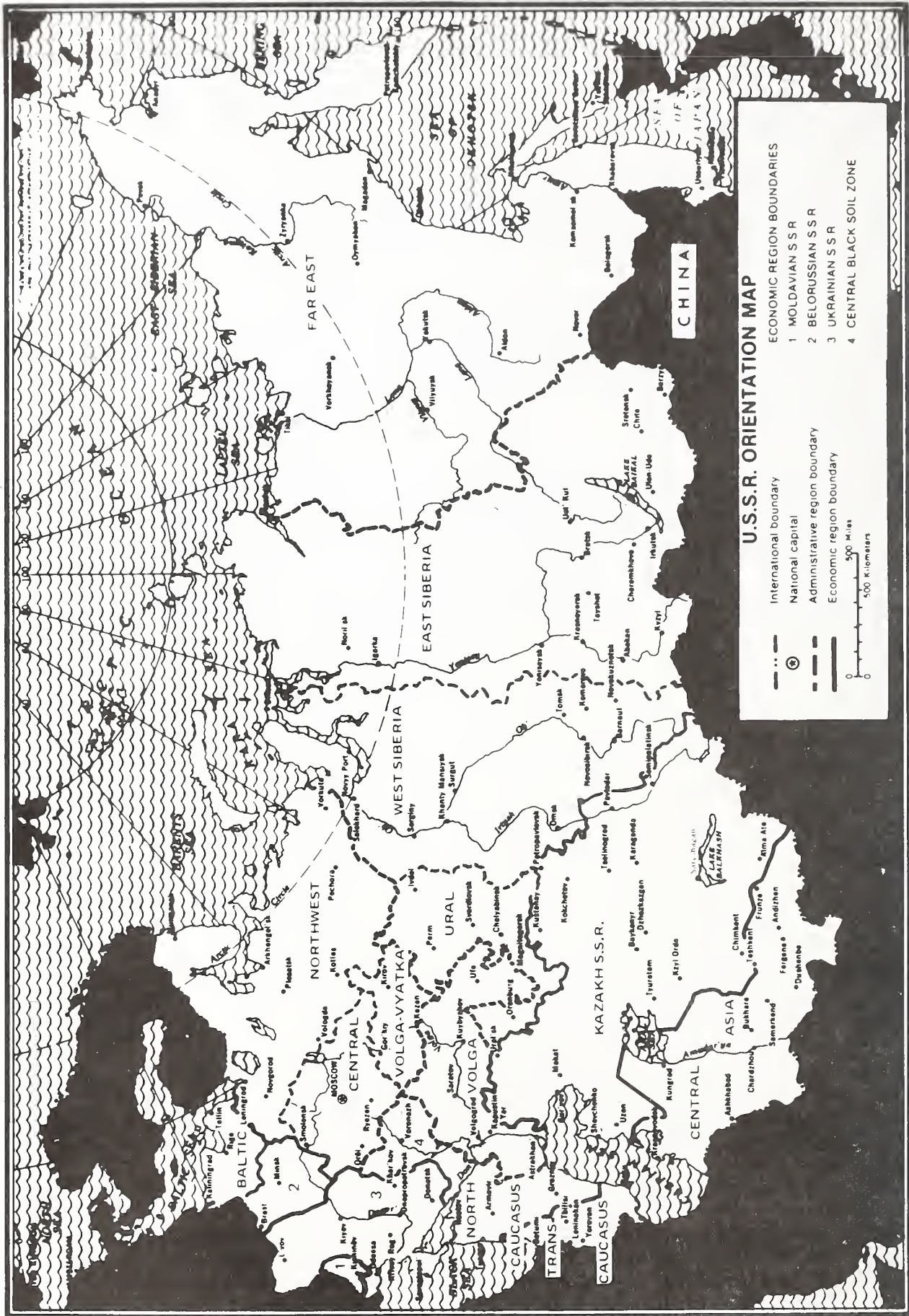
Summary

Between 1965 and 1985, the Soviet livestock sector underwent a major modernization program. During this period, increases in livestock production exceeded population growth, but production did not keep pace with growth in consumer demand. Steadily rising incomes and a policy of stable retail prices contributed greatly to the increasing excess demand for livestock products.

Production increases in 1965–85 came at a large cost in terms of labor and capital. During this period, capital productivity fell dramatically and increases in labor productivity were modest. Soviet animal productivity and feeding efficiency improved slightly but remained well behind U.S. levels.

Soviet livestock production increased roughly 4 percent per year in the late 1960's, but that growth slowed to virtually zero in 1979–82. Beginning in 1982, the Soviets enacted policies in an effort to revitalize livestock production growth rates and to curtail increases in production costs. These policies were successful in 1983–87, when the Soviet livestock sector experienced nearly a 3-percent growth rate per year.

The Soviet Union should maintain the 1983–87 livestock production growth rate into the 1990's. Costs of production are expected to continue increasing, but at a slower rate than in the 1970's. The performance of the Soviet livestock sector could improve substantially if radical economic reform is adopted. This does not appear likely, however. The Soviet demand for feed grains is expected to continue increasing, despite larger imports of protein feeds. Excess demand for livestock products in the U.S.S.R. will require major retail price increases by 1991.



The Soviet Livestock Sector Performance And Prospects

Edward C. Cook*

Introduction

Livestock products and the feeds that go into producing them account for well over 70 percent of gross agricultural output value in the U.S.S.R. Developments in the Soviet feed-livestock sector can explain much of the growth in Soviet grain imports since the early 1970's. This report analyzes Soviet attempts to modernize livestock production since 1965 and the results and costs of those attempts. This report also reviews recent policies enacted to improve performance, the results of those policies thus far, and their potential effects on performance.

During the last 20 years, the U.S.S.R. has devoted tremendous economic resources toward agriculture. Since 1965, nearly 25 percent of Soviet investment has been devoted to agriculture, which has accounted for a similar share of the Soviet labor force. Attempts to increase production of livestock products have accounted for a major proportion of these resources, either directly through raising livestock, producing feed, or performing other support operations.

Agriculture's large claim on Soviet economic resources stems in part from the leadership's perceived need to increase supplies of high-quality foods. The Soviet diet continues to lag the European and North American averages in terms of meat consumption and consumption of all animal-source proteins. Narrowing this gap remains a high priority for Soviet policymakers. The policy of maintaining generally stable retail prices for livestock commodities, in place since the early 1960's, has put added pressure on planners to increase supplies of meat and milk.

Soviet investment strategy in the livestock sector has focused on modernizing livestock operations on state and collective farms. A major feature of this modernization has been the development of industrial live-

stock facilities, primarily for poultry and pork production. Few resources have been devoted to improving or augmenting livestock production on farmworkers' private household plots. These household operations have accounted for nearly 30 percent of Soviet livestock production.

The Soviet modernization strategy has brought decidedly mixed results. Increases in livestock production have been respectable, but have been achieved largely through costly increases in the number of low productivity animals. Despite sizable investment between 1965 and 1985 in improved housing, machinery, and other inputs, most efficiency and productivity indicators in the Soviet livestock sector have failed to draw appreciably closer to standard Western performance and, in some cases, have fallen further behind.

Production in the last 20 years has not kept up with demand. Between 1965 and 1985, meat production annually increased 2.75 percent and milk production annually increased 1.5 percent, both significantly faster than population growth. However, increases in real income and a high income elasticity of demand for livestock products have meant growing excess demand for meat, milk, and milk products.

The reasons for the disappointing performance are numerous. Wage payments traditionally have been linked weakly, if at all, with economic performance. Monopoly suppliers of inputs and services have not been held accountable in their dealings with farms. As a result, the wrong inputs have been provided in an untimely manner and generally have been low-quality and overpriced. Investment projects generally have been poorly coordinated. A particular phase of a farm's livestock production usually is modernized while related operations remain unmechanized. In the U.S.S.R., this has often negated the potential positive returns to investment.

These and similar problems contributed to rapidly rising production costs for livestock products in the

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U.S.S.R. Between 1965 and 1985, the cost of producing meat and milk more than doubled. Such cost increases are high in comparison with most other sectors of the Soviet economy and came despite state efforts to cushion producers from higher input costs.

Most of the cost increases occurred after 1975 when production and labor productivity growth began to slow noticeably. Improvements in feed conversion efficiency and animal productivity registered before 1975 were largely halted or reversed in the latter 1970's.

By the early 1980's, these trends, combined with an inability to maintain previous growth rates in agricultural investment, forced policymakers to devise a new strategy for livestock sector expansion. Those new strategies are broad based and focus on improved integration of production and marketing functions, improved labor organization, and widening of bottlenecks in particular key areas such as feed production. Producer-price increases and large financial support programs for problem farms were introduced to spur production growth. Policies toward the private sector were relaxed in an effort to foster more livestock production on household plots, and attempts to reduce losses in transportation and storage gained priority.

The common linkage in most of these policies is the hope that output can be increased with a less-than-proportionate increase in inputs. A preliminary assessment of their effect indicates positive results. Production growth rates have revived in comparison

with those of 1976-81, and improvement in animal productivity has resumed. However, production costs have continued to increase.

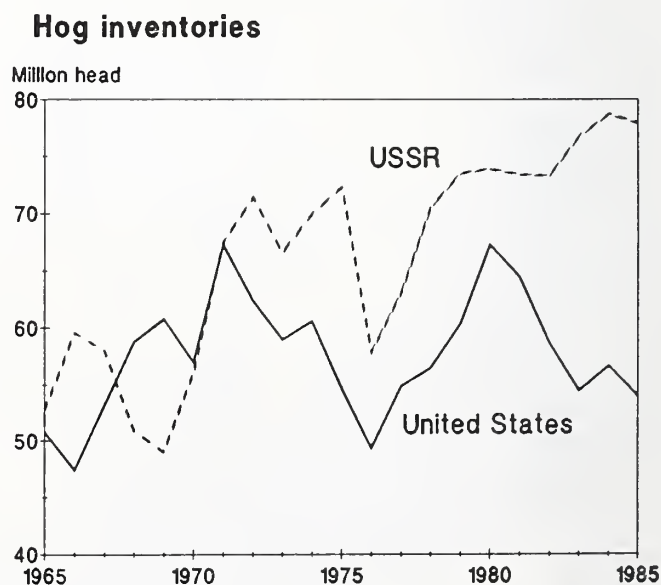
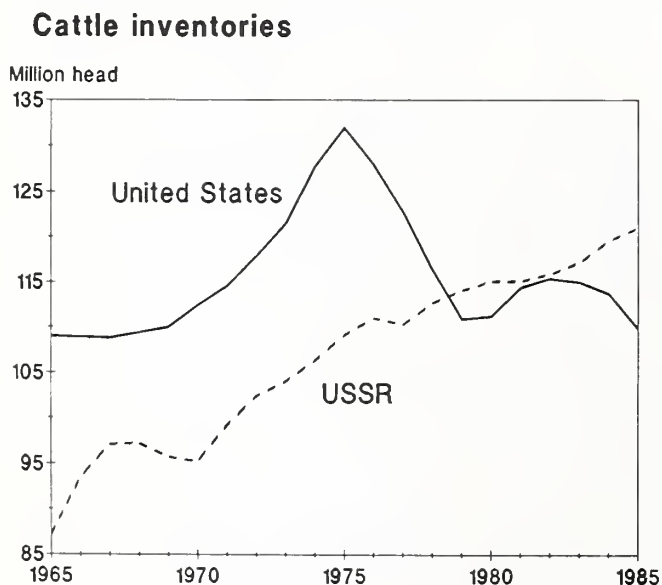
Improvement in the Soviet livestock sector was particularly strong in 1986-87. This recent upturn coincided with General Secretary Gorbachev's emphasis on implementing economic reform in agriculture. The decision to substantially increase imports of soybeans and soybean meal also contributed to productivity gains in 1986-87.

Livestock production will likely continue to increase at the more rapid post-1982 rate, but without significant changes in economic policies in agriculture, tremendous growth potential will remain unrealized. A rapid expansion of livestock production is not expected without additional major policy changes. The continued growth in production costs will force a major increase in retail prices of livestock products by 1991.

U.S.-U.S.S.R. Comparison

The Soviet and U.S. livestock sectors share a number of characteristics, but are quite different in some important ways. Both nations have vast livestock holdings. In fact, Soviet inventories of cattle have exceeded U.S. inventories since 1979, and Soviet hog inventories have exceeded those of the United States since 1971 (fig. 1). Another common characteristic is the composition of livestock production. Both nations produce more beef than any other type of meat, followed closely by pork. In both nations, poultry meat ranks third in production and

Figure 1
After 1979, U.S.S.R. livestock outnumbered U.S. cattle and hogs



has had the highest growth rate over the last 20 years. The U.S.S.R. ranks first in world milk and egg production, followed by the United States.

An important area where the two seriously diverge, however, is in animal productivity. The United States produces nearly 60 percent more beef and veal per head of cattle than does the U.S.S.R. and nearly 70 percent more pork per hog (fig. 2). The gap in productivity per head narrowed slightly for cattle between 1965 and 1985, but expanded for hogs. Since the mid-1970's, productivity per head of cattle has shown only marginal improvement in the U.S.S.R., while that of hogs has actually declined. These factors retarded the growth rates for beef and pork production, which slowed considerably beginning around 1975. The disparity is more striking in average annual milk yields per cow (fig. 3). In the United States, increases in milk production since 1965 have come entirely from higher animal productivity, while expanded Soviet cow inventories have accounted for roughly one-third of increased milk production since that time.

For egg production, the gap in per head productivity between U.S. farms and Soviet state and collective farms has narrowed considerably since 1965 (fig. 3). The Soviet figures would be lower if yield data for private plots, which account for 30 percent of Soviet egg production, were available.¹ Soviet productivity indicators are further behind U.S. measures in poultry meat

production than in egg production. For instance, in 1985, average daily weight gains for Soviet broilers were slightly more than half of those in the United States (5).² Roughly 75 percent more feed is still needed to achieve a pound of gain in Soviet broilers than in U.S. broilers (see table 9 for recent Soviet feed conversion ratios).

The poor Soviet performance is evident in much lower daily productivity of livestock (102, 53, and 49). Daily weight gains for Soviet hogs are roughly 300–350 grams (0.66–0.77 pounds) and for Soviet cattle 450–500 grams (1–1.1 pounds), roughly 40–50 percent below standard U.S. performance. The low daily gain draws out birth-to-slaughter times in the U.S.S.R. to nearly twice those in the United States and results in lower average slaughter weights for cattle (fig. 4).

Total Soviet meat production is roughly two-thirds as large as that of the United States, and the gap has narrowed slightly since 1965 (fig. 5). Based on analysis of 5-year moving averages, Soviet meat production increased roughly 4 percent per year in the late 1960's and early 1970's, but slowed to less than 2 percent in the late 1970's. Between 1978 and 1982, Soviet meat production did not increase. Meanwhile, demand for meat in the U.S.S.R. has continued to increase strongly since 1975.

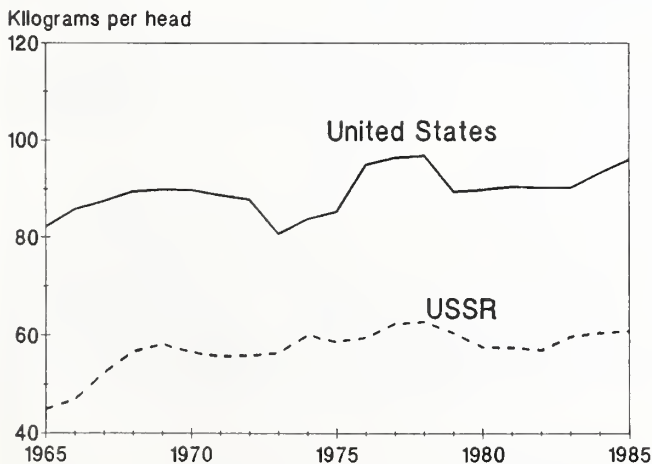
In most cases, the gap in per head productivity between the United States and the U.S.S.R. has nar-

¹The assumption of lower egg yields on private plots is indicated by available data on private- and social-sector egg yields in Bulgaria and Poland (26, 42). Italicized numbers in parentheses refer to literature cited in the References section.

²Italicized numbers in parentheses refer to literature cited in the References section.

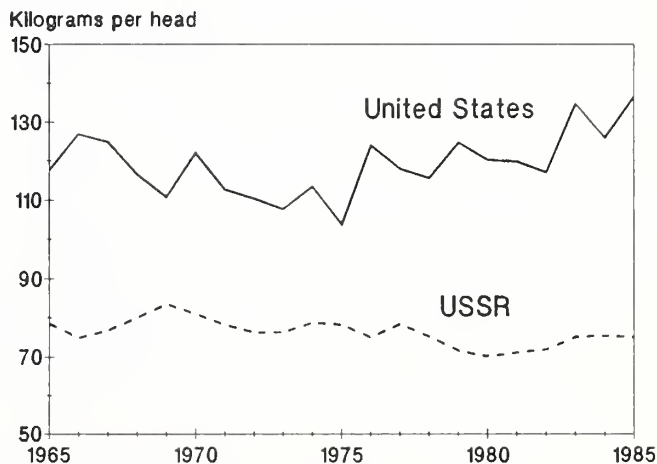
Figure 2
Cattle and hog productivity was higher in the United States

Beef and veal 1/



1/ Calendar-year production divided by beginning-year inventories.

Pork 1/



1/ Calendar-year production divided by beginning-year inventories.

rowed little, if at all, in the last 20 years. Improvement has been modest at best, since the mid-1970's, except in the poultry sector. This has been clearly reflected by trends in feed conversion efficiency. Most improvements were registered by the mid-1970's.

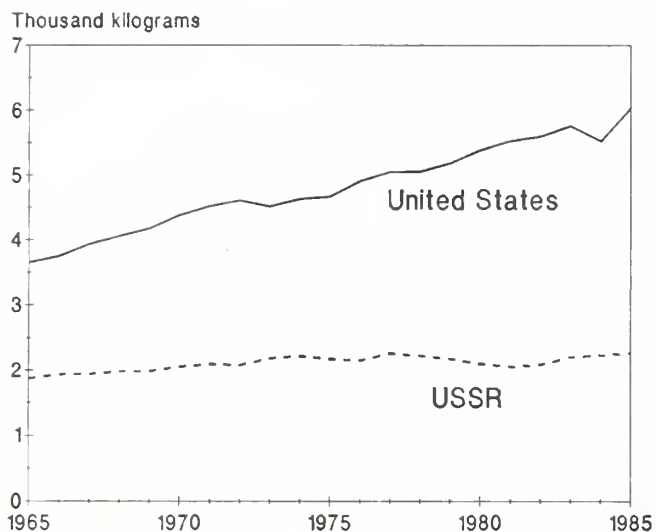
Current U.S. feed requirements are roughly 40 percent lower.

Is the Soviet record necessarily a poor one from an economic point of view? Possibly in the context of

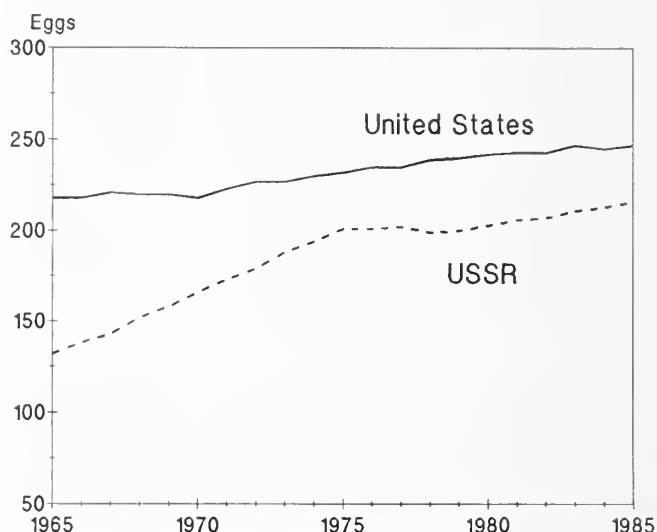
Figure 3

Cow and hen productivity was also higher in the United States

Milk per cow



Eggs per layer

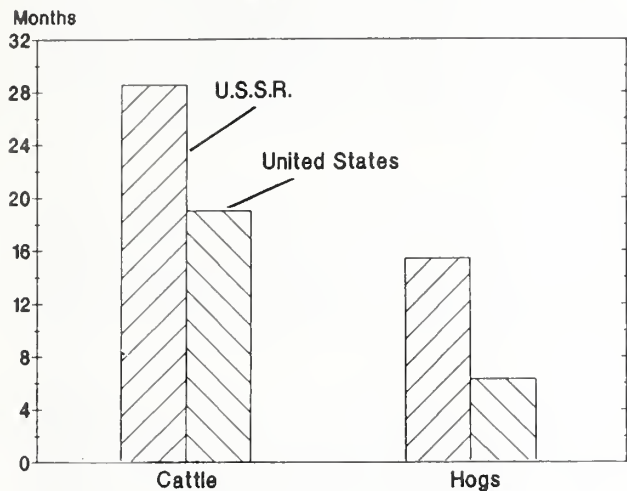


Most Soviet hogs are raised in unconfined operations, such as these on a hog farm in Kazakhstan. Feeding efficiency and animal productivity under such conditions are well below U.S. standards.

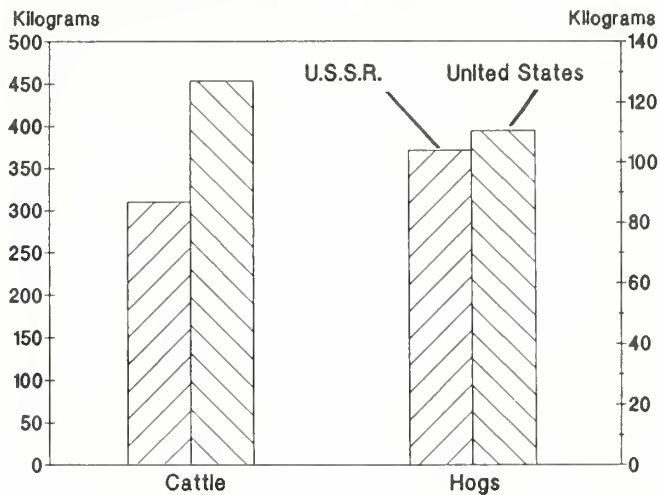
Figure 4

In 1984, it took longer to raise livestock in the U.S.S.R., and average cattle slaughter weights were lower.

Average birth-to-slaughter times, 1984



Average slaughter weights, 1984



Soviet resource availability, with the continued large share of labor in agriculture, it has made more sense to pursue the extensive (or animal inventory) growth strategy, rather than to attempt to emulate Western performance more closely. The data required to rigorously answer this question are not available. But it appears, from the tremendous investments devoted to modernizing the Soviet livestock sector since 1965, that policymakers had another growth strategy in mind. Soviet feed-livestock specialists consistently criticize the practice of relying on extensive growth as being economically unjustified, requiring too many expenditures per unit of production for housing, equipment, and labor, and spending too large a share of feed on animal maintenance (51). The failure of livestock productivity to respond to the large investments has been a key factor behind the rapid growth in Soviet livestock production costs since 1965.

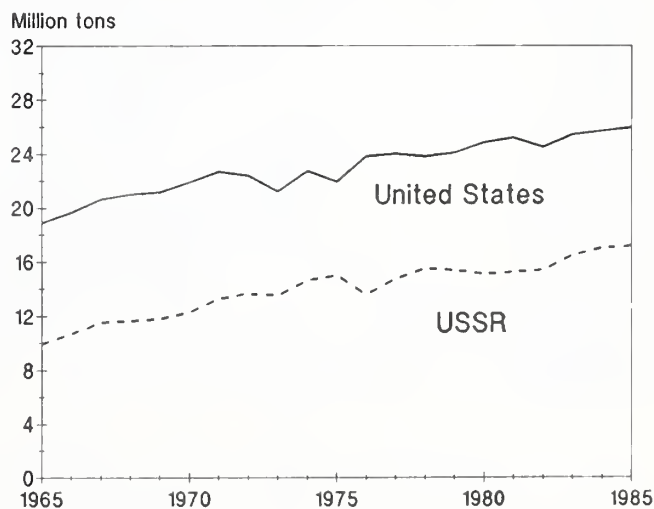
Consumption of Livestock Products in the U.S.S.R.

Nearly 25 percent of total investment in the U.S.S.R. has been devoted to agriculture since 1965. This investment effort has resulted in dietary improvements. Between 1965 and 1985, per capita consumption of meat, milk, and eggs increased considerably, although for meat and milk, much of the improvement was attained by 1975 (table 1). Between 1975 and 1983, meat consumption per capita held steady at 57–59 kilograms, while per capita milk consumption declined in the late 1970's and early 1980's. Of the major live-

stock products, only egg consumption continued the previous uptrend after 1975. Despite a large allocation of resources to agriculture, the declining growth in meat production in the mid-1970's led Soviet policymakers to rely increasingly on meat imports to maintain per capita consumption. The U.S.S.R. became the world's largest net importer of fresh/frozen meat by 1980. In 1981, meat imports accounted for 6 percent of total meat supplies, compared with 2.7 percent in 1975.

Figure 5

In 1965-85, total U.S. meat production surpassed that in the USSR



The Soviet diet has been adequate for calorie content for quite some time. But, the U.S.S.R. continues to lag the average of developed Western nations in consumption of both meat and total animal-source protein.

Meat

Accurately comparing international meat consumption is difficult due to national differences in accounting or a lack of required data. The Economic Commission for Europe of the United Nations (ECE) provides comparative data on per capita consumption of beef, pork, poultry, and sheep- and goat-meat for most nations of Europe and the U.S.S.R. Average consumption for 1980-82 for these four types of meat and their totals are ranked in table 2.³ The U.S.S.R. ranks near the bottom of European countries in terms of apparent per capita consumption of meat. The U.S.S.R. level is roughly half of the comparable U.S. figure. However, the U.S.S.R. ranks fairly close to Western nations, such as the United Kingdom, Finland, and Sweden, and actually exceeds the per capita meat consumption level of Norway.

³These data, averaged for 1975-79, are presented in (28).

These figures, constructed from data provided by the Food and Agriculture Organization of the United Nations (FAO) and the Statistical Office of the European Community, and national statistics of the ECE member countries, exhibit certain inconsistencies and therefore are considered indicative rather than absolute. Given the ECE definition (carcass weight minus both slaughterfat and offals), the estimate for the U.S.S.R. is probably overstated by 4-5 kilograms because not all slaughterfat and offals are excluded (12).

Milk and Eggs

The U.S.S.R. ranked slightly above average among European and North American nations in per capita egg consumption at the beginning of the 1980's (table 3). Soviet consumption has increased 8 percent since then.

The U.S.S.R. is the world's largest milk producer and, in terms of per capita milk production, ranks ahead of such developed Western nations as the United States, Canada, and the United Kingdom. But, a very large share of Soviet milk protein never reaches the consumer. In fact, a larger share of produced milk protein is fed to livestock in the U.S.S.R. than in any of these



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Consumption and supply of livestock products, particularly of eggs, has increased since the 1960's. However, demand for meat and some milk products continues to significantly exceed supply.

Table 1—U.S.S.R.: Per capita consumption of selected foods

Year	Meat ¹	Dairy ²	Fish	Sugar	Grain ³	Potatoes	Eggs
	<i>Kilograms</i>					<i>Number</i>	
1965	41	251	12.6	34.2	156	142	124
1970	48	307	15.4	38.8	149	130	159
1975	57	315	16.8	40.9	141	120	216
1980	58	314	17.6	44.4	138	109	239
1984	60	317	17.5	44.3	135	110	256

¹Includes fat and edible offals.

²Milk and milk products, including butter in whole milk equivalent.

³In flour equivalent.

Source: (97).

Table 2—Ranking of per capita meat consumption, by type of livestock for selected European nations and the U.S.S.R., 1980–82 average

Ranking	Total	Beef and veal	Pork	Poultry	Sheep and goat
	<i>Kilograms</i>				
France	92.6	32.3	38.8	17.3	4.2
Belgium	90.7	27.1	48.1	13.7	1.8
East Germany	90.2	22.0	57.1	9.4	1.7
West Germany	82.8	22.3	49.9	9.8	.8
Austria	81.0	24.8	45.4	10.8	—
Switzerland	80.4	27.3	43.8	7.9	1.4
Ireland	78.7	25.1	31.2	14.6	7.8
Hungary	77.6	9.9	46.3	21.4	—
Czechoslovakia	75.7	23.0	43.0	9.7	—
Netherlands	71.1	19.5	41.6	10.0	—
Italy	69.8	25.6	24.6	18.2	1.4
Ireland	66.3	11.5	4.4	—	50.4
Spain	65.5	11.5	27.8	22.5	3.7
Denmark	64.4	12.0	43.6	8.8	—
Poland	64.3	18.2	36.9	9.2	—
Greece	64.1	19.0	17.6	14.4	13.1
United Kingdom	62.1	19.6	21.5	13.8	7.2
Bulgaria	60.3	10.6	29.2	13.2	7.3
Romania	59.6	11.9	28.3	16.3	3.1
Finland	59.2	22.9	33.0	3.3	—
Sweden	57.4	17.5	34.6	5.3	—
U.S.S.R.	54.5	24.7	17.0	9.3	3.5
Norway	48.0	19.3	20.0	2.9	5.8
Yugoslavia	47.1	14.5	18.1	12.1	2.4
Portugal	44.1	12.1	14.7	14.6	2.7

— = negligible or none.

Source: (18).

comparison nations. The U.S.S.R. ranks 15th among 27 European and North American nations in milk production per capita, but ranks only 20th among those 27 nations in per capita consumption of milk protein (25).

Total Animal-Source Protein

Despite high per capita consumption of eggs and fish, the U.S.S.R. ranks low among European and North American nations in per capita consumption of animal-source protein (table 4). As with the ECE data of meat consumption, these data of protein supplies are considered indicative rather than absolute. The U.S.S.R. outranks Portugal, Bulgaria, Romania, and Yugoslavia, is roughly comparable with Hungary, Italy, Spain, and

Table 3—Ranking of per capita egg consumption for selected nations, 1979–81 average

Ranking	Consumption	Ranking	Consumption
	<i>Kilograms</i>		<i>Kilograms</i>
Hungary	18.6	Netherlands	12.9
West Germany	17.0	Canada	12.8
East Germany	17.0	Poland	12.4
Spain	15.8	Sweden	12.2
United States	15.6	Romania	12.1
Czechoslovakia	15.5	Switzerland	11.6
Austria	14.7	Greece	11.5
France	14.6	Italy	11.4
Belgium	13.9	Bulgaria	11.2
Denmark	13.6	Finland	10.7
Ireland	13.6	Norway	10.2
U.S.S.R.	13.3	Yugoslavia	9.0
United Kingdom	13.0	Portugal	5.4

Source: (25).

Table 4—Daily per capita consumption of animal-source protein for selected nations, 1979–81 average

Ranking	Total consumption	Consumption share by source ¹			
		Meat	Milk	Eggs	Fish
	Grams	Percent			
Denmark	72.2	35	39	6	20
United States	71.5	57	31	7	5
France	69.6	53	33	6	8
Norway	66.3	30	44	5	14
Belgium	64.7	53	34	7	7
Canada	62.0	54	32	6	8
East Germany	61.7	56	29	9	7
Finland	60.1	35	46	5	14
Switzerland	60.1	50	39	6	4
West Germany	59.7	55	30	9	6
Netherlands	59.5	43	46	7	5
Ireland	59.3	50	39	4	7
Sweden	58.7	36	41	6	16
Czechoslovakia	58.4	54	34	8	4
Poland	58.3	42	42	7	9
Austria	57.0	58	31	8	4
United Kingdom	53.8	51	35	7	7
Greece	52.4	48	35	7	10
Spain	50.9	48	25	10	17
U.S.S.R.	50.4	42	32	8	17
Italy	50.1	54	31	7	8
Hungary	49.3	58	28	12	2
Romania	45.0	50	37	8	5
Bulgaria	43.4	55	33	8	4
Yugoslavia	38.4	53	36	7	3
Portugal	34.8	53	20	5	22

¹Percentages may not add to 100 due to rounding.
Source: (18).

Greece, and is not far from matching some higher income Western nations. The U.S.S.R. consumes about 85 percent of the animal-source protein of a median nation such as West Germany or the Netherlands, and about 70 percent of the animal-source protein of Denmark and the United States, the leading nations.

Demand for Livestock Products in the U.S.S.R.

Excess demand, or demand above actual consumption, for meat, milk, and milk products has increased in the U.S.S.R. during the last two decades. The policy of limiting increases in retail food prices, the low quality and lack of availability of nonfood consumer goods, and the steady rise of per capita incomes have all contributed to a strong demand increase for Soviet livestock products. The gap between quantities supplied and demanded has grown more rapidly since 1975.

Demand plays a less immediate role in determining production levels and prices within the Soviet economy than in the economies of market-oriented nations. Producers have little direct contact with consumers

and try to satisfy production and supply targets established by the state rather than consumer preferences revealed at the marketplace. To an extent, the state must consider consumer preferences both in establishing its plan targets and in the ongoing allocation of resources. But, the determination of economic priorities is tightly controlled by the state, which frequently ignores consumer preferences.

In the distribution of consumer goods, effective demand is considered a less satisfactory guide in the U.S.S.R. than it is in Western countries. [For a discussion of effective demand in the context of the Soviet economy, see (6) and (52).] Housing, medical care, and food, classified as primary needs of the population, are highly subsidized by the state budget. The reluctance to use prices as a rationing mechanism means that food prices in the state retail network have increased little since the early 1960's. A combination of increased production costs for livestock products in the last 20 years and a reluctance to increase retail food prices has led to burgeoning state retail price subsidies for food, which grew from 3.5 billion rubles (\$3.9 billion at the official exchange rate) in 1965 to 54.6 billion rubles (\$67.2 billion) in 1983 (14, 72). The large majority of these subsidies is devoted to meat and milk (table 5). By 1983, retail food price subsidies accounted for 14 percent of all state budgetary expenditures, while subsidies for meat and milk alone accounted for 11 percent (15, 73).

The growing subsidization of retail food prices has boosted consumer demand for high-quality food items, particularly meat. Soviet prices for food, compared with most other consumer goods including clothing and consumer durables, have been lower than in Western nations. By 1983, retail prices in the U.S.S.R. covered much less than half of the production costs for beef, lamb, and butter, and roughly 55–60 percent of the production costs for milk and pork (table 6).

Between 1975 and 1983, domestic production plus net imports of meat were sufficient to maintain per capita meat consumption at 57–59 kilograms. Over the same period, real per capita income reportedly increased by

Table 5—U.S.S.R. retail food-price subsidies

Year	Meat	Milk	All foods
<i>Billion rubles</i>			
1965	2.8	—	3.5
1970	8.8	2.1	13.3
1975	14.2	4.0	19.8
1980	14.0	7.5	25.1
1983 ¹	25.6	18.7	54.6

— = negligible.

¹Includes bonus payments to economically weak farms.

Sources: (15, 72, 74, and 75).

more than 20 percent (91). Most Soviet and Western estimates point to a relatively high income elasticity of demand for meat in the U.S.S.R. Between 1975 and 1983, when per capita supply of meat was generally constant, per capita demand for meat increased roughly 15 percent (12).

Since 1975, the official Soviet meat price index has increased only 2.6 percent (91). Actual meat prices probably increased by more than the official index indicates. This could result from the introduction of new product varieties not included in the index, an increased share of meat sold "under the counter" at prices higher than established by the state, and higher prices charged on the collective farm markets, which are not included in the state index. However, price increases were not sufficient to offset the diverging movement in income levels and meat supply. A top agricultural specialist at the U.S.S.R. Institute of Economics recently estimated that effective demand for meat, given current incomes, is approximately 70–75 kilograms, or roughly 25 percent above actual consumption in 1983 (86). This degree of excess demand for meat has resulted in queuing and localized rationing programs and has pressured the state to significantly increase meat supplies in coming years or to allow substantially higher retail meat prices. Excess demand for milk and milk products has also increased in recent years (86, 87).

Meat refers to a fairly broad range of commodities distinguishable by the type of animal (pork, beef, or poultry) and, in many cases, the quality of cut from that animal. Though there is a shortage of meat supplied in aggregate at current prices, some very low-quality cuts may be in excess supply. Furthermore, the market for meat in the Soviet Union is highly differentiated by region, with some regions experiencing smaller shortages (such as major cities) than others. In addition to the state trading network where most meat is purchased, collective farm markets sell higher quality meat at prices well above official state prices. With excess demand for meat of roughly 20–25 percent, and the inelastic demand for meat, price increases would have to be sizable to balance most of these markets.

Table 6—U.S.S.R. average retail prices, production costs, and state budget payments for selected livestock products, 1983

Item	Beef	Pork	Milk	Butter
<i>Rubles per kilogram</i>				
Average retail price	1.77	1.84	0.24	3.38
Average production cost	4.75	3.25	.42	8.18
State budget payments	3.68	1.97	.29	6.28

Source: (15).

Soviet Livestock Production by Sector

Soviet livestock production comes from two distinct types of producers: the large-scale state and collective farms of the socialized sector, and the small-scale household, or private-plot operators. The state and collective farms have benefited from major investment in their livestock operations over the years and account for more than 70 percent of Soviet livestock production. Private-plot livestock producers operate on a very small scale, holding an average of one-half acre each, are limited by law in the number of animals they can keep, and have rudimentary levels of mechanization and livestock housing. However, they account for nearly 30 percent of Soviet livestock output. State and collective farms fall into one of two categories: either livestock complexes, which are nearly fully mechanized and have priority access to state inputs, or traditional farms, which are less specialized and have both a significant portion of their operations unmechanized and lower priority access to feed and other inputs.

Socialized-Sector Production

The socialized sector consists primarily of state and collective farms that average 40,000 and 16,000 acres. Workers on these farms generally are assigned to a particular type of production. Of the 22.9 million workers employed in socialized-sector agricultural production in 1984, 5.7 million were assigned directly to livestock (91). In contrast with family farming, these workers are on the job for a particular time period, much like shift-workers in industry. Wage payments traditionally have not been closely linked with work performance. Wage payments are based on hourly or daily rates or on a piecework basis, with consideration not necessarily given to the quality of work performed. State or collective farmworkers are rarely fired for poor performance.

Farm managers, appointed by the state, are evaluated on how well they carry out plan directives and guidance from above, and not strictly on whether or not their farms are operating profitably. The numerous directives passed down to the farm manager frequently are not consistent and the farm manager must choose which directives deserve primary attention.

Soviet farms face difficulties in dealing with other organizations involved in agricultural production and marketing. Farms face state-run monopoly suppliers of inputs and have little alternative to the state-run farm service network. They must sell the majority of their products to the state procurement network, which is responsible for grading purchased commodities and has frequently abused this power to the detriment of

farms. In recent years, Soviet policymakers have devoted a great deal of attention to these organizational and managerial problems. In November 1985, the Ministry of Agriculture merged with four related ministries and the State Committee for Agricultural Technology to form the State Committee for the Agro-Industrial Complex (Gosagroprom). One major reason for this reorganization was to improve linkages among farms, input suppliers, and food marketing organizations.

In contrast with U.S. agriculture, regional self-sufficiency continues to be an important feature of Soviet livestock production, retarding the development of production specialization. In 1984, roughly 95 percent of Soviet state and collective farms raised cattle, 93 percent produced milk, and 68 percent raised hogs. The typical state and collective farm in 1984 had 1,140 hogs and roughly 1,900 head of cattle, of which 600 were cows (91). A large percentage of state and collective farms remains close to this average scale. Slightly more than 1 percent, or approximately 550 farms, hold more than 7,000 head of cattle. The level of specialization in hog production is higher, though well below the potential of the large scale of Soviet farming. Of the state and collective farms that raise hogs, 12 percent, or about 4,100 farms, hold more than 3,000 hogs.

Most Soviet farms tend to spread production activity rather than to specialize. Lack of specialization persists due to the inability of transportation and marketing systems to adequately move livestock products from low- to high-cost production regions. Lack of specialization is reinforced through planning and pricing. Annual targets for sales to the state of numerous livestock products are passed down to individual farms, forcing them to maintain a full range of livestock production. Preferential farm prices and operational subsidies support high-cost livestock producers (these will be discussed later).

Modernizing Socialized-Sector Production Since 1965, the Soviets have invested 100 billion rubles in livestock housing and equipment, roughly 4 percent of economy-wide investment for this period. This figure does not include investment in feed production and other activities supporting livestock production. Official data indicate that significant progress has been made in the effort to increase the level of mechanization (table 7). Since 1965, new livestock housing has been provided for 70 percent of the cattle and 90 percent of the hogs in the socialized sector (51). A major part of the modernization drive has been the introduction of industrial livestock operations, or livestock complexes. Since 1975, a third of investment in the livestock sector has been allocated to development of these com-

plexes (85). The livestock complexes have differed from traditional state and collective farms in that they are generally larger scale operations, are nearly fully mechanized (91), and receive priority access to industrially supplied inputs such as mixed feeds.

To improve horizontal integration at the local level, the Soviets established interfarm associations for livestock fattening and mixed-feed production. Established since 1965, these associations aim to improve efficiency by realizing economies of scale at the local level. Some livestock associations purchase hogs and cattle from member state and collective farms for finishing and others are involved in industrial poultry operations. The mixed-feed associations rely heavily on locally supplied feeds, receiving some assistance from the state mixed-feed industry for supplies of protein-vitamin additives. Thus far, the interfarm livestock and mixed-feed associations have been widely introduced in the Ukraine, but remain much less numerous in the Russian Republic and Kazakhstan.

The drive to modernize livestock production in the socialized sector has not met with the intended results, either in productivity or in costs of production. A large part of the problem is the poor coordination and integration of investment projects on farms. Farms receive approval from the state for large investment work on a project-by-project basis. Investment is typically made in particular phases of production, while operations before and after that phase frequently remain unchanged. In practice, this often negates potential productivity increases (55, 94). Soviet farms are also plagued by the low quality of installed machin-

Table 7—Degree of mechanization of livestock operations in the socialized sector

Operation	1970	1975	1980	1985
	<i>Percent</i>			
Cow milking	56	83	90	94
Feeding:				
Cattle	12	29	45	58
Hogs	28	60	66	74
Poultry	38	73	85	91
Watering:				
Cattle	68	81	89	92
Hogs	81	95	94	96
Poultry	77	94	95	96
Stall cleaning:				
Cattle	30	56	75	84
Hogs	42	80	86	93
Poultry	38	78	86	91
"Complex" mechanization:				
Cattle	9	25	42	56
Hogs	23	56	63	72
Poultry	23	59	72	84

Source: (91).

ery, an inappropriate mix of available machinery, a shortage of spare parts for repair, poor quality of supplied feeds (particularly mixed feeds), and an irregular supply of electricity from the state power network. These problems mean that despite improvements in indicators of mechanization (table 7), manual labor continues to account for a large proportion of work in livestock production in the socialized sector. Despite the high indicators of mechanization, machines are used in only 40 percent of work in hog production and in only 50 percent of milk production (55).

Livestock Complexes The economic performance of the industrial livestock complexes is better than average. The prime costs of production per ton of beef and pork, for example, are lower by 37 and 32 percent compared with normal state and collective farms (91). The reasons for the lower costs include access to higher quality off-farm inputs and in most cases an operation where housing facilities and equipment are more fully integrated.

Thus far, industrial livestock production has most significantly affected poultry meat and egg production, accounting for more than half of total Soviet produc-

tion of both (table 8). The limited degree of specialization in cattle production and in milk production is reflected in the low shares of industrial complexes in these areas.

Poultry. In 1965, Ptitseprom, the State Poultry Industry Trust, was founded to modernize poultry production. The Ptitseprom system includes breeding farms, incubator-hatching stations, poultry-raising farms, and more than 900 factory facilities (37). By 1982, Ptitseprom accounted for 60 percent of all egg production in

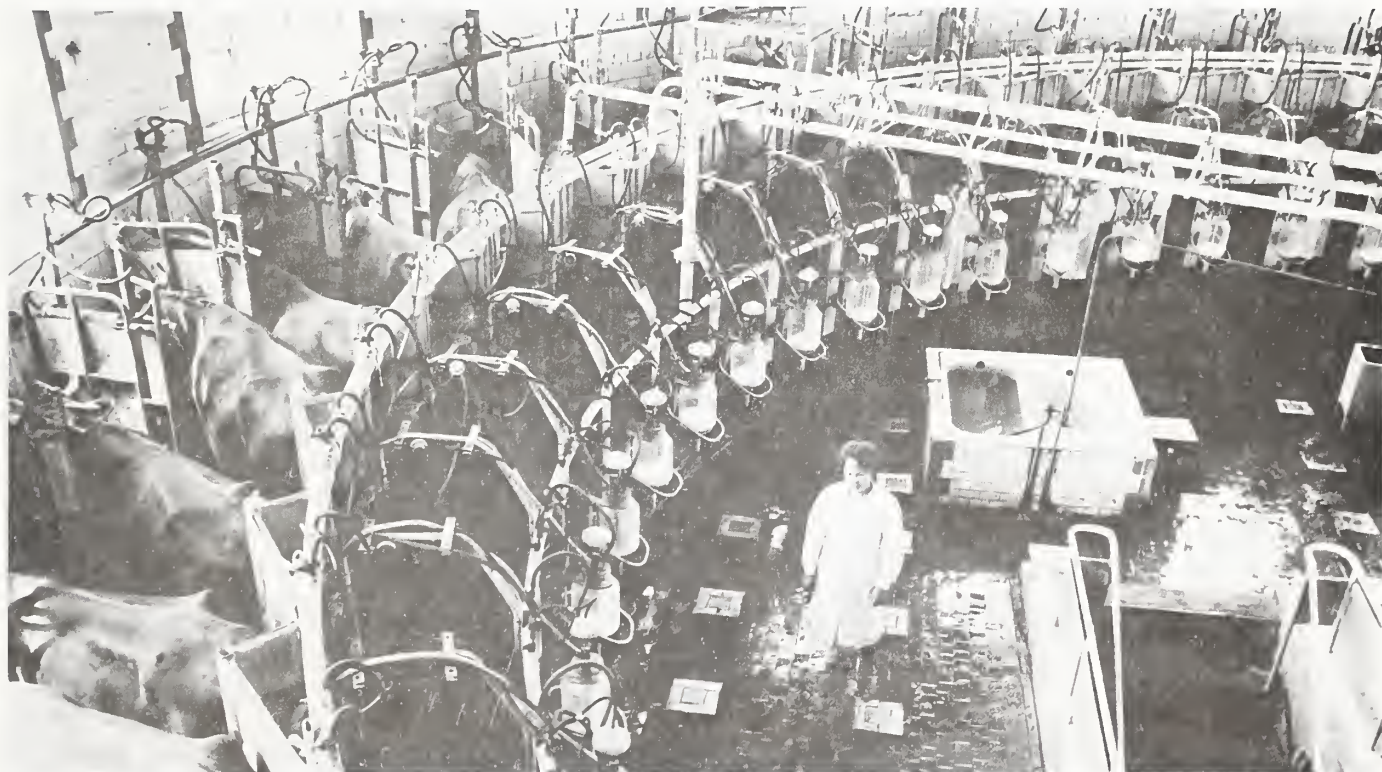
Table 8—Production of selected livestock products by sector, 1985¹

Sector	Pork	Beef	Milk	Poultry meat	Eggs
	Percent				
Socialized sector	65.0	83.3	77.1	65.0	71.9
Industrialized complexes	19.5	4.7	4.8	57.2	62.6
Other farms	45.5	78.6	72.3	7.8	9.3
Private plots ²	35.0	16.7	22.9	35.0	28.1
Total	100.0	100.0	100.0	100.0	100.0

¹ Pork, beef, and poultry meat in liveweight.

² Does not include subcontracting work for the socialized sector.

Sources: (84, 102, and 103).



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Despite the large Soviet investment in increasing mechanization, livestock production still directly employs about 5 million people, some in highly mechanized "carousel" milking parlors in the Russian Republic.

the U.S.S.R. and 56 percent of all poultry-meat production. The remainder was produced on state and collective farms not affiliated with Ptitseprom and in the private sector.

A decline in production costs of poultry meat and eggs compared with other types of livestock production has propelled the expansion of the Ptitseprom network. Feed requirements per unit of gain in egg and poultry-meat production by Ptitseprom operations declined between 1965 and 1985, while feed requirements for other types of livestock production have generally remained the same or increased (table 9). Ptitseprom's favorable performance is due partly to its top priority in receiving mixed feeds and other inputs from the state. The coordinated mechanization of production operations and firm links with breeders, input suppliers, and processors set Ptitseprom enterprises apart from traditional poultry farms.

Hogs. Slightly more than a sixth of Soviet pork production comes from the industrial complexes. These complexes have annual capacity for fattening of 12,000, 24,000, 54,000, and 108,000 head, with most falling in the smaller two categories (93). Efficiency indicators are higher for these large-scale operations than for hog production on traditional state and collective farms. Feed requirements per unit of gain are lower, average daily weight gain is nearly a third higher, and the prime cost of production is reportedly 32 percent less than on normal state and collective farms (91, 93, and 102). Reasons for better performance on industrial hog complexes compared with traditional Soviet farms are similar to those for the Ptitseprom enterprises including priority access to

mixed feeds and other inputs, and almost fully integrated mechanization. Though performance is good on these complexes, it remains below U.S. standards in terms of feed conversion efficiency and average daily weight gain. Pork production per head of beginning-year inventories on Soviet complexes is less than 75 percent of the average U.S. hog farm.

Mixed feeds account for more than 90 percent of rations on hog complexes. Most of these complexes are far from self-sufficient in these feeds and depend on allocations from state mixed-feed supplies. In years of normal grain production, grain imports play an important role in maintaining state mixed-feed production. In years of poor grain production, the significance of imports increases. Shortage of protein is a major problem with Soviet mixed feeds. Despite priority access to feed supplies, the general low quality of Soviet mixed feeds is a significant barrier to improved performance on hog complexes (79).

Beef. Beef production is much less industrialized. By 1984, industrial complexes accounted for only 4.5 percent of beef production. As with hogs, economic performance on the beef complexes significantly exceeds that of the socialized sector as a whole. Direct labor expenditures are only 25 percent as large, and feeding efficiency is markedly better on the beef complexes (102).

Most beef production in the U.S.S.R. continues to rely on dual-purpose breeds such as Simmenthal, and specialized dairy breeds such as the black and white, and the red steppe. There are 4 million head of beef cattle in the U.S.S.R., approximately the same number

Table 9—U.S.S.R. feed-conversion factors for state and collective farms¹

Year	Beef	Pork	Milk	Broilers ²	Eggs ²
Kilograms ¹					
1965	11.8 ³	9.8 ³	1.5 ³	5.3 ⁴	3.9 ⁴
1970	11.5 ³	9.2 ³	1.4 ³	4.6 ⁴	2.6 ⁴
1975	12.6 ⁵	8.7 ⁵	1.45 ⁵	4.2 ⁴	2.1 ⁴
1980	13.4 ⁶	9.2 ⁶	1.5 ⁶	4.3 ⁴	2.1 ⁴
1981	13.8 ⁷	9.0 ⁷	1.6 ⁷	4.2 ⁶	N.A.
1982	13.4 ⁶	9.2 ⁶	1.6 ⁶	4.0 ⁸	2.0 ⁹
1983	13.2 ⁶	8.8 ⁶	1.55 ⁶	4.1 ¹⁰	1.9 ¹⁰
1984	13.5 ⁶	8.8 ⁶	1.55 ⁶	N.A.	N.A.
1985	13.5 ⁶	8.8 ⁶	1.6 ⁶	4.0 ¹⁰	1.9 ¹⁰

N.A. = not available.

¹For beef, pork, and broilers, table presents the amount of all feed in oat units required per kilogram of liveweight gain. For milk, the amount of all feed required per kilogram of milk production. For eggs, the amount of all feed required per 1,000 eggs produced.

²Ptitseprom system only.

³(92).

⁴(37).

⁵(21).

⁶(96, 97, 98, 99, and 103).

⁷*Ekon. Sel'sk. khoz.*, No. 1, 1983.

⁸*Muk-Elev. i komb. prom.*, No. 9, 1982.

⁹*Vest Sel'khoz. Nauki*, No. 7, 1983.

¹⁰*Ptitsevodstvo*, No. 9, 1984 and No. 2, 1986.

More than half of Soviet poultry meat production and a fifth of Soviet pork production takes place in industrial complexes such as these two located in Lithuania.



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as in the early 1950's (11). This figure represents only about 3 percent of the total cattle holdings of 120 million head. Most beef cattle are held in the spring grain belt of Kazakhstan and adjacent portions of the Russian Republic (RSFSR) (see map). An inability to match output per ruble of expenditure on dual-purpose cattle has hindered expansion of the beef cattle industry. A shortage of quality onfarm feeds including generally low-quality pastures, a shortage of off-farm grain for finishing, and a lack of adequate attention at livestock-breeding stations to the problem of beef cattle development all contribute to disappointing beef cattle performance. Furthermore, costs are not controlled to the necessary extent. Typical construction for beef cattle operations is modeled after that for dairy cattle and is far more extravagant than what is common in the United States. The Soviet beef cattle industry also uses too much labor.

Prospects for the Soviet beef-cattle industry are of particular interest for their bearing on meat production plans for 1990 and beyond. A recent shift in emphasis by the state to increased milk yields per cow rather than to increased cow numbers means that not enough beef can be produced from dual purpose and dairy herds to meet beef production targets without a radical improvement in productivity per head. Soviet livestock specialists, therefore, consider expansion of the Soviet beef-cattle industry to be a reasonable strategy for reaching meat production targets (11, 68).

Dairy. Experience in specialized dairy operations has been mixed. Feed shortages and poor quality rations have kept many dairy complexes underused and milk yields disappointingly small. Prime costs of production on dairy complexes are only slightly lower than for traditional farms (102). Soviet agricultural specialists have complained about the low genetic potential of animals at dairy complexes and the inadequate planning of the complexes themselves. For example, two-thirds of the large dairy farms in the Russian Republic have no hard-surface access roads and half have no facilities for dry cows (31).

Disease problems were particularly pronounced on the industrial dairy complexes. Poor equipment design and the use of breeds not fully adapted to industrial milking operations were two contributing factors. These problems are possibly being handled more effectively now. Between 1980 and 1985, milk yields increased more rapidly on the industrial complexes than on the standard state and collective farms.

Private-Plot Agriculture

Private-plot agriculture is made up of the household plots of state and collective farmworkers as well as of

plots of rural households involved in nonagricultural sectors of the economy. The role of private plots in Soviet livestock production remains large, though over the long term, private production has accounted for a declining share of production. The private sector accounts for 30–40 percent of pork, poultry meat, and egg production and for only a slightly smaller share of milk production (table 8).

Private-plot livestock production is largely for onfarm or local consumption. Some commodities are marketed, either through the state purchasing organizations, state or collective farms, the consumer cooperative network, or collective farm markets. The consumer cooperatives serve primarily rural areas where the state retail network remains particularly inadequate. Collective farm markets are similar to farmers' markets in the United States. Private-plot owners are able to sell their products directly to consumers at market prices, but those sellers not conveniently located near cities face problems in transportation and storage of their commodities.

According to a highly respected Western expert on Soviet private plots, the share of private-plot meat production marketed through traditional channels is slightly more than 30 percent. The share of private-plot egg production marketed is roughly 12–15 percent, and the share of private-plot milk production marketed is less than 10 percent (107). In 1981, the state introduced new contracting arrangements that counted livestock raised on private plots and sold to state and collective farms under contract as socialized sector production. Inclusion of the new contracting arrangements resulted in higher marketed shares from private plots, particularly of milk.

There are roughly 33.8 million private household plots averaging about a half acre each.⁴ About 80 percent of these households raise livestock, according to a Soviet estimate (36). The scale of the typical household plot is far from adequate to guarantee necessary feed supplies. For this reason, private-plot owners rely heavily on feed from the socialized sector. Table 10 provides a Soviet estimate of sources of feed used on private plots during 1976–80.

The accuracy of these estimates is open to question. Based on many complaints in the Soviet press about feeding bread to livestock and about theft of feed from socialized sector supplies, the last two categories in table 10 could easily be underestimated. Private-plot livestock producers also purchase young animals for

⁴These do not include the 11.3 million garden and orchard association members, mostly city dwellers who raise fruits and vegetables on plots averaging a sixth of an acre (78).

fattening from the socialized sector and have been able to purchase a limited amount of support in crop cultivation and veterinary services from the state and collective farms.

The state economy has not fostered the expansion of private-plot livestock production, and production on these plots remains very labor-intensive. For example, production of appropriate equipment and tools has been extremely limited and production of machinery for crop and livestock production on the private plots is virtually nonexistent. Marketing links between private-plot production and consumers also have not been adequately developed. Soviet policymakers have long perceived a conflict of interest between the management of state and collective farms and the workers on those farms that are involved in private-plot production. Their reasoning has been based on the notion that the more involved workers become in private-plot production, the more likely workers are to shirk their work responsibilities toward the socialized sector.⁵ Thus, limitations have been placed on the scale of private-plot agriculture, including the number of animals that could be maintained. This tendency to limit private agriculture has conflicted with the need to expand agricultural production. The result has been a series of alternating favorable and unfavorable periods for private-plot production. Recent policy developments have generally encouraged production on private plots and have reduced some of the longstanding barriers between socialized sector and private-plot agriculture.

Little research in the U.S.S.R. has dealt with private plot agriculture. Data on production costs, feeding efficiency, or capital stock have not been available. Estimates of labor expenditures on private plots have differed widely. The Soviet Statistical Yearbook excludes the labor of workers employed in socialized sector agriculture who tend private plots in their spare

time from its estimate of labor expended on private plots. Only the labor of household members not employed in socialized sector agriculture is considered, and the resulting figure is approximately 4 million labor-years per annum.⁶ Another estimate by Soviet researchers that included the number of people employed in the socialized sector, but also working on private plots, estimated labor on private plots at 22.5 million labor-years for 1975 (36). This figure is nearly equal to labor expenditures in the socialized sector.

Trends in Production Costs

Between 1965 and 1985, the development of industrial livestock complexes and the modernization of livestock facilities on state and collective farms only partially succeeded in improving performance in the Soviet livestock sector. Meat production on state and collective farms (including complexes) doubled, and milk production increased by two-thirds. Over the same period, fixed assets employed in livestock production on these farms increased four to five times (19, 44, and 94). Increased labor productivity accompanied the increasing capital/output ratio. Labor directly expended per unit of pork production was cut by more than half between 1965 and 1985, with smaller declines in milk and beef production (table 11). Feeding efficiency in the socialized sector showed only modest improvement, if any, since 1965 (table 9).

The U.S.S.R. Central Statistical Bureau constructs and publishes data on the prime cost of agricultural production. These data are based on prices for production inputs that are state-set and are not free to respond to competing alternate uses. Soviet prime cost excludes land rent, interest payments on long-term credit, and a number of minor expenditure categories attributed to production costs in the United States (111). Despite these drawbacks in Soviet cost accounting, prime cost reflects the financial expenditures required of the typical Soviet state or collective

⁵For a recent example of this position, see (16) and (34).

Table 10—Source and average share of feed used in private-plot livestock production, 1976–80

Source	Share
	<i>Percent</i>
Grown on private plots	33
Payment-in-kind for work in socialized sector	15
Purchased from the socialized sector	19
Obtained with authorization from meadows and pastures in the socialized sector	11
Food-industry byproducts	2
Food scraps	2
Other sources	18
Total	100

Source: (50).

⁶One labor-year represents the amount of labor time regularly expended by a full-time worker in a 12-month period.

Table 11—Direct labor expenditures on production of selected livestock products

Year	Milk		Beef		Pork	
	Collective	State	Collective	State	Collective	State
<i>Labor days per 100 kilograms</i>						
1965	22	15	111	76	93	46
1966–70	14	10	71	48	60	30
1971–75	11	9	61	46	44	23
1976–80	10	8	53	41	37	19
1985	9	7	48	39	35	17

Sources: (28, 91).

farm per unit of livestock production and provides a measure of performance within the Soviet institutional framework.

Production costs of most livestock products increased rapidly between 1965 and 1985. During that period, prime costs of beef production nearly tripled, prime costs of milk production more than doubled, and prime costs of pork production roughly doubled on state and collective farms (tables 12 and 13). Production costs for beef, pork, and milk increased more rapidly after 1975 on collective farms, but slowed modestly on state farms. In contrast, the costs of egg and poultry meat production on state farms, where about 90 percent of eggs and more than 80 percent of the poultry meat in the socialized sector are produced, remained stable.

The magnitude of the livestock production cost increases during 1965–85 was large compared with cost trends elsewhere in the economy. Also, these in-

creases came despite official attempts to stabilize farm costs. Since 1965, the state has taken major steps to shield farms from increasing prices for machinery, fertilizer, and other inputs (73, 89). In 1967 and 1982, farms were compensated through subsidies for across-the-board increases in producer prices for inputs supplied by industry. By 1982, the value of these subsidies to farms reached 8.2 billion rubles (\$11.3 billion) (74). In addition to compensating farms for price increases for existing products, prices for newly introduced types of machinery and fertilizer were set in part to reflect their productivity relative to existing types. Guidelines also existed for limiting increased labor costs. A basic tenet of state economic planning and administration has been that increases in nominal wage rates should not exceed those in labor productivity (105). State and collective farms have been pressured to adhere to this guideline.

How then can we explain a doubling of livestock production costs in the Soviet context in the last 20

Table 12—Prime cost of production of selected livestock products on state farms

Year	Milk	Beef ¹	Pork ¹	Poultry ¹	Eggs ²
<i>Rubles per ton</i>					
1965	163	1,052	1,067	N.A.	75
1966–70	176	1,179	1,080	1,564	66
1971–75	220	1,572	1,289	1,678	61
1976–80	279	2,044	1,552	1,713 ³	62
1980	308	2,344	1,726	N.A.	64
1982	332	2,484	1,819	1,655	63
1983	341	2,550	1,845	1,653	63
1984	357	2,731	1,907	1,651	63
1985	380	2,922	1,975	1,626	63

N.A. = not available.

¹Liveweight gain.

²Per thousand.

³1976–79 average.

Sources: (28, 66, and 91).

Table 13—Prime cost of production of selected livestock products on collective farms

Year	Milk	Beef ¹	Pork ¹	Poultry ¹	Eggs ²
<i>Rubles per ton</i>					
1965	155	989	1,124	N.A.	76
1966–70	168	1,130	1,187	1,181	73
1971–75	199	1,397	1,353	1,615	72
1976–80	254	1,866	1,770	1,864 ³	81
1980	287	2,177	2,018	N.A.	87
1982	308	2,312	2,174	2,123 ⁴	88
1983	312	2,271	2,117	2,075 ⁴	86
1984	327	2,415	2,213	2,146 ⁴	89
1985	340	2,527	2,313	2,228 ⁴	92

N.A. = not available.

¹Liveweight gain.

²Per thousand.

³1976–79 average.

⁴Including interfarm enterprises.

Sources: (28, 66, and 91).

years? Higher extraction and transportation costs for raw materials, particularly metal ores and energy raw materials, are considered a legitimate production cost increase (111). Higher prices for raw materials filtered through the economy and accounted for some of the increased production costs in the livestock sector. However, cost increases from this source were not nearly large enough to account for a doubling of production costs.

A major contributing factor was that wage rates in agriculture have, in fact, increased more rapidly than labor productivity. Another important factor was the low quality of material inputs and their inappropriate maintenance and use on farms (3, 45, and 56). As dependence on industrially supplied inputs increased in the last 20 years, the problems associated with the production and use of these inputs became more pronounced.

Labor

Labor costs per unit of livestock production increased between 1965 and 1985, particularly toward the end of this period. Between 1965 and 1975, increases in labor productivity nearly compensated for increases in wage payments, leaving direct labor costs only slightly larger. During the late 1970's, direct labor cost increases accelerated. This acceleration continued in the early 1980's (tables 14 and 15). Labor productivity increases in livestock production were modest be-

tween the 1976-80 average and 1984, and were easily outstripped by the growth in wage rates (see table 11).

Narrowing the traditional gap between worker incomes in industry and agriculture is often cited as a policy goal in the U.S.S.R. During the first half of the 1980's, despite the slowdown in annual labor productivity growth in agriculture to 1.2 percent, state farmworkers received average annual wage increases of 4.3 percent (91). Wage increases for collective farmworkers increased more rapidly, by 5.3 percent per year (100, 101). In comparison, wage increases for industry-workers averaged just 2.6 percent per year (91).

Workers involved in livestock production were targeted for special additional bonuses based on continuous length of service in their particular jobs (59, 68). The wage increases for workers in livestock production were considered essential for improving performance and productivity in a sector which, despite increasing indicators of mechanization, continues to be characterized primarily by manual labor.

The Soviet press regularly refers to the low prestige accorded to livestock production workers and the difficulty in attracting skilled young workers to replace retiring workers (21, 24, and 63). This is not surprising considering the fact that on farms with so-called "complex mechanization" of operations, manual labor continues to account for 45-50 percent of all labor expenditures for cattle production and 35-40 percent for hog production (56). The corresponding figures for farms with partial mechanization is higher (10, 55). According to the director of the All-Union Scientific Research Institute for Mechanization of Livestock Raising, a number of reasons exist for the failure of labor productivity to improve more significantly following increased capital availability. These reasons include the supply of machinery and equipment inappropriate for use on many farms (in large part resulting from a lack of necessary variety in product lines), the low quality and lack of dependability of machinery, the poor organization of labor on the farm, and the poor servicing of machinery in operation (56).

Housing and Mechanization

Amortization and current repair accounted for an increasing share of livestock production costs between 1965 and 1985. This increase matched the growing capital/output ratio. During this time, housing accounted for the largest share of capital investment in livestock production and construction costs for livestock housing rose sharply after 1965. The cost of providing new housing for cattle more than doubled between 1965 and 1978 (table 16). These increases continued after 1978 and now measure roughly three

Table 14—Direct labor costs on collective farms for selected livestock products

Item	1971-75 average	1976-80 average	1981-83 average
<i>Rubles per ton</i>			
Liveweight gain:			
Beef	322.0	357.6	418.0
Pork	260.2	292.2	358.0
Milk	60.6	71.9	88.0
Eggs ¹	13.5	12.7	13.8

¹Per thousand.

Source: (105).

Table 15—Direct labor costs on state farms for selected livestock products

Item	1971-75 average	1976-80 average	1981-83 average
<i>Rubles per ton</i>			
Liveweight gain:			
Beef	293.2	316.6	353.0
Pork	157.3	156.9	171.0
Milk	60.7	66.6	82.0
Eggs ¹	5.2	3.6	3.5

¹Per thousand.

Source: (105).

Table 16—Average cost of new housing for cattle per billet

Type of farm	1965	1970	1975	1978
<i>Rubles</i>				
Collective	368.8	525.7	858.2	870.6
State	450.5	541.2	848.8	958.7

Source: (44).

times the 1965 level (85).⁷ Over the same period, output generated from new livestock housing has not increased nearly as much. In the Russian Republic between 1970 and 1980, the amount of hog production (liveweight) per hog billet did not increase. On cattle production farms, it increased less than 10 percent (46).

The cost of modernizing and upgrading existing livestock housing has also increased. Since 1980, the average cost of modernizing both cattle and hog housing has increased nearly 50 percent (46).

Problems in producing and maintaining appropriate machinery for livestock production have contributed to increasing amortization and current repair costs. According to existing procedure, profit in industries supplying inputs to agriculture is established as a set percentage of prime costs of production (39). This procedure has rewarded input producers for higher prices. Moreover, agricultural input industries have been subject to little effective outside control in price setting for newly introduced or redesigned inputs (40, 88). As a result, prices charged to farms for new machinery and other industrial inputs have increased considerably more than increases in input productivity. [For example, the average price of a tractor horsepower has increased 80 percent since 1965 (88).]

Because there is no competition among producers of industrial inputs for agriculture, farms are forced either to accept what is available or to go without. Furthermore, the agricultural machine-building industry receives low priority, compared with defense and other industries, for the supply of quality metal. As a result, the quality of Soviet agricultural machinery is typically lower than comparable machinery in Western nations.

The Ministry of Machine Building for Feed and Livestock Production is responsible for producing livestock machinery. Its performance is evaluated primarily on the total value of machinery it produces in a given year. For this reason, there is a bias toward production of large-scale, relatively expensive machinery. Also,

⁷According to this source, the cost of modernizing existing cattle housing is 936 rubles or 75 percent of the cost of new construction. Another article states that the cost of livestock housing per billet now is 2–3 times as expensive as it was in 1970 (51).

there is resistance to introducing new product lines if the startup costs threaten to pull down the value of total output in any given year.

Until 1985, there was little effective control over the State Committee for Agricultural Technology (the primary supplier of repair services for farms) to either improve the quality and timeliness of its repair work or to minimize its costs. Soviet farms frequently complained of being charged above state-set rates for such services, or in some cases for being charged when no repair work or service was performed. As a result, state and collective farms went to great lengths to carry out repair and servicing work themselves (40). However, many farms were not adequately equipped for repair work. In the Russian Republic in the early 1980's, roughly a quarter of state and collective farms lacked basic repair workshops, and three-quarters lacked technical service stations capable of more complex servicing of machinery (46). Farms are at least partly to blame for the poor returns to housing, machinery, and equipment. The lack of accountability for the maintenance of capital at the farm level is an important factor contributing to low returns to capital. The use of machinery and equipment by poorly trained, unskilled workers is a problem in the U.S.S.R. and lowers capital productivity.

Feed

Feed has accounted for roughly 55–60 percent of production costs of beef, pork, poultry meat, and eggs, and slightly more than 40 percent of the cost of milk production. Higher feed costs contributed more than any other category to the absolute increase in livestock production costs during 1965–85. A number of factors contributed to higher feed costs, including the low quality of inputs, the poor coordination of their use in feed production, a lack of price control over monopoly suppliers of inputs, and a wage policy poorly linked to productivity. Unlike most developed countries, Soviet feeding efficiency has improved little since the 1960's (except for poultry) and in some cases actually has worsened. Also, the share of low-cost feeds in Soviet rations (such as pasture) declined after 1965.

Despite much more extensive processing and preserving of feeds, a change consistent with livestock modernization, feed conversion efficiency has failed to improve. A large proportion of low-quality feeds and an inappropriate mix of feeds in animal rations have restricted improvements in Soviet feeding efficiency. A large share of Soviet roughage feeds, such as hay and silage, has traditionally been of such low quality that it has contributed little to animal productivity and can negate the positive effect of higher quality feed when included in the same ration. Soviet feed rations

are also too low in protein and other feed components. Furthermore, traditional policy has led many farms to keep low-productivity livestock. A large part of a farm manager's annual performance evaluation has hinged upon whether or not the farm's livestock inventories increased during the year. For that reason, many low-productivity animals have been maintained.

Current Attempts to Improve Performance

The experience of the last two decades demonstrates that large financial resources alone cannot guarantee increased livestock production in the Soviet Union. Under current plans, investment in livestock and feed production is expected to remain large, but not to increase at rates characteristic of the past. The Soviets hope to achieve greater returns from their agricultural investments by changing how agriculture operates. Some changes focus on improving the availability of appropriate inputs and others focus on coordinating available inputs more efficiently. The overall goal is to put Soviet livestock production on an "intensive" growth path; that is, to generate more output per unit of input. The success of these policies will affect both the Soviet standard of living and Soviet imports of grain over the next decade.

Technical Policies

An important set of policies aim to improve performance of the livestock sector through technical improvements. These technical improvements include attempts to improve the quality and increase the quantity of feed, and to increase the genetic potential of Soviet livestock.

Feed Supplies Soviet feed resources are sizable. In addition to feeding nearly as much grain as in the United States, the U.S.S.R. is a major producer of hay, haylage, and silage, and holds extensive pasture. The low quality of Soviet feeds often blocks improved livestock sector performance (19, 22).

The low quality of Soviet feeds stems from the lack of adequate harvesting, handling, and storing capabilities. Soviet agricultural specialists often cite overall nutrient losses in roughages as high as 20–30 percent (21, 23, and 32). Another serious problem with Soviet feeds is a shortage of protein (particularly for the amino acids lysine and methionine) and various vitamins and minerals. The shortfall in protein is usually cited as 10–15 percent of requirements (17, 60, and 82). This is equivalent to roughly 4–6 million tons of digestible protein. The shortage of protein and other feed components also contributes to an overexpenditure of feeds (particularly grain), reduced animal productivity, and higher costs of production.

The shortage of protein, vitamins, and minerals is particularly evident in Soviet mixed-feed production. Less than 10 percent of Soviet mixed feeds are produced according to recommended formulations (65). This is not surprising, given that in the late 1970's the state mixed-feed industry was supplied with 50 percent or less of the necessary amounts of numerous vitamins, minerals, and amino acids (21, 65). At that time only 19 percent of Soviet mixed feeds met standards for protein content (9), and this situation improved little through 1985 (47).

The potential for increasing domestic feed production in the U.S.S.R. is probably large. D. Gale Johnson has noted that yields for hay crops relative to grain in the U.S.S.R. are much lower than in climatically similar regions in North America (35). The implication is that roughage crops in the U.S.S.R. have not received adequate resources and could well offer higher marginal returns to input use than grains.

The U.S.S.R. could improve performance of the livestock sector by increasing the quality and quantity of feeds, and by improving the mix of available feeds. Since the late 1970's, the Soviets have focused attention on all three areas and have shifted investment priority within the feed-livestock sector from construction of livestock housing to creation of a more reliable feed base (80).

The Soviets are greatly expanding feed storage capacity in the socialized sector and have devoted larger investment to feed harvesting and handling machinery. Between 1980 and 1986, storage facilities for silage and haylage crops increased 75 percent and now reportedly meet nearly 80 percent of national requirements. Storage facilities for hay doubled, and now meet 20 percent of requirements. Facilities for root crops roughly quadrupled, and now meet 33 percent of national requirements (23, 60). Processing of roughage crops to improve the preservation of nutrients has also expanded since the late 1970's.

The Soviet Union has adopted a number of policies since 1982 to increase domestic protein production. These policies include: expanding high-protein oilseed and pulse crops, shifting roughage crop area away from grass crops to higher protein leguminous crops, such as alfalfa and clover, and expanding industrial production of single-cell protein and limiting amino acids.

Beginning in 1983, the drive to increase domestic protein production has been coupled with a cutback in imports of protein meals, particularly soybean meal. U.S.S.R. policymakers apparently felt that their nation could eliminate the protein shortage by enforcing in-

creased self-sufficiency. However, the success of these protein policies was mixed at best. Between 1982 and 1986, single-cell protein production increased 40 percent and limiting amino acids production, such as lysine, also increased (71). Alfalfa and clover hay production increased some, but domestic oilseed production improved little. As a result, protein shortages in Soviet feed rations, particularly in mixed feeds, persisted.

Gorbachev's emphasis on intensification means that growth in livestock production should come from more output per head rather than expanded inventories of low-productivity animals. Fuller satisfaction of protein requirements is required if livestock productivity is to increase soon. Given the disappointing results of the protein self-sufficiency programs, the Soviet Union has substantially increased its imports of soybean meal since 1985. The effect on livestock productivity has been noticeable (fig. 6).

Attempts to increase domestic protein production continue, despite the renewed dependence on imports. Procurement prices for oilseeds were increased in 1987 by as much as 60 percent. Bonus payments for sales of oilseeds above plan quotas were doubled. In addition, the Soviets are discussing changes in retail prices for oilseed meal, which would make mixed-feed producers more interested in expanding oilseed meal use (13).

Expansion of roughage-crop production is a potentially major source of increased feed in the U.S.S.R. Between 1980 and 1985, farms in the U.S.S.R. increased the area devoted to sown roughage crops from 66.9 million hectares to 69.8 million, while decreasing the area devoted to grain. Soviet agricultural specialists admit that given the costs of bringing new land into agricultural use, the potential for further land area increases is negligible (54). As a result, emphasis rests squarely on increasing yields. Roughage-crop fields have benefited from a major increase in fertilizer use since the 1970's, but fertilizer use remains well short of long-term goals (60, 67). Roughage-crop fields remain seriously short of necessary phosphate and potassium supplies (4) and, along with grain, are a top priority for additional fertilizer use.

Roughage crops continue to account for a predominant share of crops grown on land with irrigation facilities (about 45 percent, compared with 24 percent for grain). Roughage crops also account for nearly 50 percent of drained land under crops and are likely to maintain high priority as more irrigable and drained land is brought into crop production. The continued priority for roughage crops on improved land and the significant increases in fertilizer use probably contrib-

uted substantially to the 10-percent increase in yields of sown roughage crops between 1976-80 and 1981-84 (33).

Another source of apparently large potential increases in feed production is natural feedlands. With 330 million hectares of pasture and 40 million hectares of meadows, the U.S.S.R. possesses extensive holdings of natural feedland. Yields on these lands are exceedingly low, however. Soviet pastureland yields less than 0.3 oat units of feed per hectare and Soviet meadowland yields 0.6-0.7 oat units.⁸ There has been little upward movement in these figures since the 1960's. The U.S.S.R. faces significant obstacles to increasing feed production from its meadows and pastures. More than 50 percent of Soviet natural feedlands are located in desert or semidesert regions of Central Asia and Kazakhstan, where moisture deficiencies are severe. Nearly 25 percent of Soviet pastures and meadows are located on saline and alkaline soils, and extensive areas are overgrown with bush, are boggy and poorly drained, or are damaged by wind and water erosion (2, 67).

Farm managers have given less attention to natural feedland since the 1960's because of the growing importance of mechanized feed production and industrial livestock production. Plans for broad-scale improvement of meadows and pastures in the 1980's have been implemented well behind schedule (33, 69). Even in areas where very expensive improvement work on meadows is carried out, hay yields have increased by less than 50 percent (54).

Grain will continue to be the most important component of Soviet livestock rations. The Soviets have frequently tried to increase grain yields in recent years. Fertilizer use on small grains increased 40 percent between 1980 and 1985, and the amount of clean summer fallow in crop rotations increased from 13.8 million to 21.3 million hectares (97). The Soviets are attempting to limit their expansion of domestic grain use, thereby reducing their import dependence. Feed use of grain has accounted for nearly all of the increase in Soviet grain use since 1965. Until recently, attempts to save on feed use of grain focused on substituting roughages for grain in ruminant feed rations rather than on increased availability of protein concentrates. Between 1979 and 1984, there was no increase in Soviet grain feeding despite a 10-percent increase in livestock production. Most of the grain savings came in ruminant rations. For example, between 1982 and 1985, the amount of concentrates (primarily grain) per unit of liveweight gain for cattle in the socialized sector declined by more than 25 percent (78). Since

⁸One oat unit equals the energy value of 1 metric ton of oats.

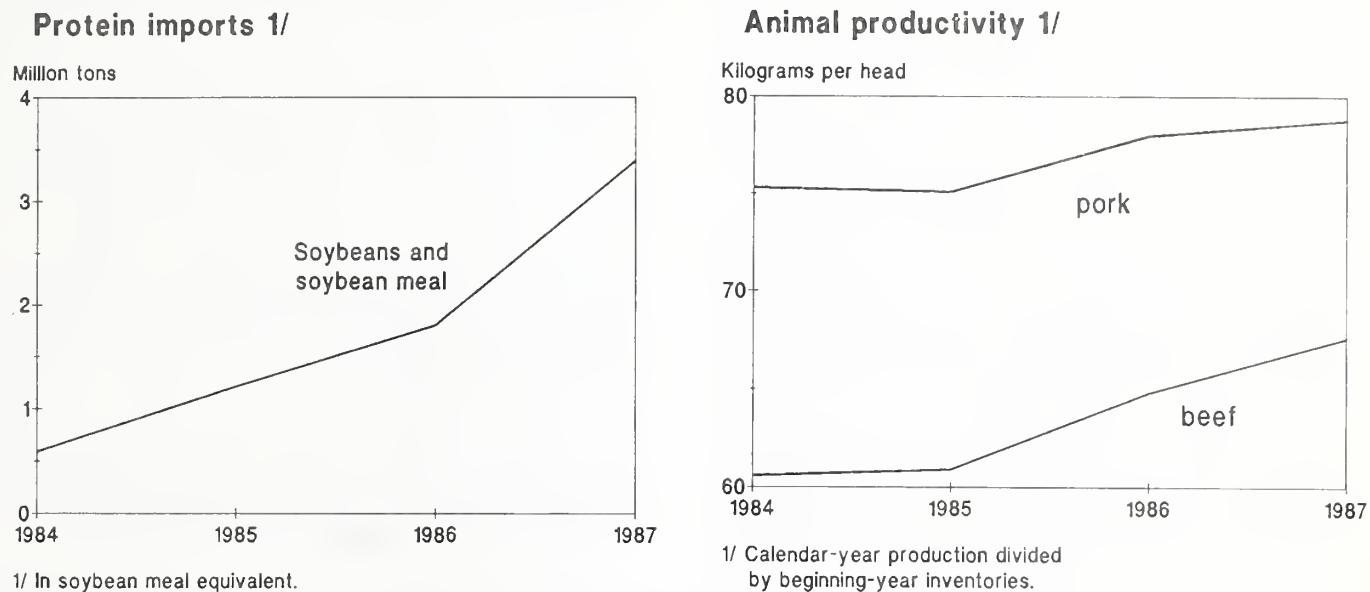
1985, the Soviets have increased protein imports, which should also save on grain in feed rations.

Overall, Soviet feed policies have brought some positive results in recent years. Feed supplies exceed the 1980 level by roughly 10 percent, mostly because of

higher production of silage and hay. The quality of Soviet roughage feeds has also improved since 1980, with a smaller proportion of silage, haylage, and hay rated as low quality (33, 61, and 83). Continued emphasis along these lines will likely bring further improvements in both the quality and quantity of feeds.

Figure 6

Higher protein imports increase animal productivity



A mixed sunflower-corn field is harvested for silage, as greater emphasis has been placed on improving Soviet roughage feed supplies since the late 1970's.

Animal Breeding The Soviet animal-breeding network is centrally administered and extensive. There are more than 1,400 breeding farms for cattle, hogs, and sheep (106). Yet, animal breeding in the U.S.S.R. is, and traditionally has been, hindered by organizational and management shortcomings (62). These shortcomings include poor performance-testing procedures, improper recordkeeping, low pay for livestock breeding workers, and on some farms an inadequate supply of equipment and feed. Furthermore, Soviet policy-makers expect livestock breeding farms to contribute to state production plans by delivering livestock products, which hinders the farms' primary breeding tasks.

The failure to significantly improve animal productivity (except for poultry) in the last 10 years has been due in part to these shortcomings. Soviet specialists, however, have claimed that the productivity potential of livestock actually has increased substantially since the early 1970's, but has not been realized because of the inadequate feed base (22). The genetic potential of animals being bred reportedly has allowed milk yields of 3,000–3,500 kilograms or about 30–50 percent above the current average (19, 51).

There is little evidence that the underlying shortcomings of the Soviet livestock-breeding system will be significantly reduced in coming years. Areas of partic-

ular emphasis are in dairy cow breeding, where a program of cross-breeding imported Holstein-Friesian cattle with domestic dairy breeds will be expanded in the late 1980's (49). Work is also continuing to develop animals more suited to industrial livestock operations, particularly cows.

Financial Policies

Policies to increase farm prices and support income levels for financially weak farms play an important role in Soviet livestock sector performance.

Pricing Escalating production costs during the 1970's eroded the profitability of livestock production. By the early 1980's, most types of livestock production were unprofitable (table 17). Because livestock products accounted for more than half of Soviet agricultural production, the overall financial situation of Soviet state and collective farms also slipped. In 1982, net profits of state and collective farms fell to just 1.3 billion rubles (\$1.8 billion), and more than half of these farms were unprofitable.

To remedy the situation, in January 1983 the state enacted the largest procurement price increases on record: an across-the-board increase for all farms and a supplemental bonus program for low-profit and un-



TASS FROM SOVFO TO

The U.S.S.R. is attempting to increase milk yield potential by the "Holsteinization" of domestic breeds with sperm imported from the West.

profitable farms. The increased gross revenue of these increases amounted to 24.7 billion rubles (\$33.4 billion), of which more than 70 percent was attributable to higher livestock prices (74). The increases immediately restored profitability to farming in general and livestock production in particular.

In the Soviet economic context, the degree of profitability does not necessarily indicate where farms are likely to direct production resources. Despite the unprofitability of livestock production in the early 1980's, farm managers were expected to maintain livestock inventories and to meet specific plan targets for sale of livestock products to the state. These indicators were more important than profitability to a farm's performance evaluation. The state used numerous indirect subsidy programs for farms that lost money on livestock production.

In this context, should one expect much of a supply response to the procurement-price increases enacted in January 1983? Production data indicate that there was a response. Meat and milk production actually fell between 1978 and 1982, but in 1983, meat production increased 7 percent and milk production increased 6 percent.⁹

Ability to rely on further farm price increases to spur livestock production may be limited at this point. Twenty-seven percent of Soviet budgetary expenditures are directed to agriculture. Without significant retail price increases, raising farm prices would only add to the burden of Soviet budgetary expenditures to agriculture. Moreover, as production costs continue to expand, the initial positive effect of the 1983 price increase appears to be subsiding for all livestock production except of poultry and milk (table 17). Chairman of the newly formed U.S.S.R. State Agro-Industrial

⁹One could argue that the higher production resulted from larger feed supplies and not from higher livestock prices, but the anticipated improvements in livestock-sector profitability could have caused the increased feed production.

Table 17—Farm profit as a percentage of prime costs of production

Product	1981	1983	1985
	<i>Percent</i>		
Milk	-3	20	20
Beef	-8	19	7
Pork	-6	21	6
Mutton and lamb	-7	26	-11
Poultry meat	5	12	18
Wool	-4	14	-5
Grain	64	81	49
Sunflowerseed	123	154	127
Sugar beets	-4	29	30
Cotton, raw	23	33	34

Sources: (20, 74).

Committee, Vsevolod Murakhovskii, recently stated that despite the price increases, 42 percent of Soviet farms are raising cattle at a loss (58). New price increases may be necessary to avoid a return to the average unprofitability that characterized the early 1980's.

The introduction of supplemental bonus payments for financially weak farms complicates an already confused system of farm prices in the U.S.S.R. By differentiating procurement prices down to the farm level, this program further impedes attempts to increase the cooperative transfer of livestock and feeds among farms. Farms receiving bonuses from the state would have to receive comparably attractive offers from neighboring farms to sell livestock or feed. The farms outside the bonus program could have difficulty matching the higher bonus prices.

Income Support for Weak Farms The bonus payments for low-profit and unprofitable farms represent one part of a larger program to improve the financial health of the weakest state and collective farms. The goal is to raise all farms to a level of financial self-sufficiency and in the process to improve incentives and production potential for livestock production on financially lagging farms. In addition to the price bonuses, 9.7 billion rubles (\$13.1 billion) in outstanding debt owed by economically weak farms was written off, and a grace period was granted on another 11 billion rubles (\$15 billion) of principal and interest (68).

One rationale for the support programs is that the Soviets do not assess differential land rents. Thus, farms with relatively poor soil and climate conditions, or those facing higher transportation costs, are at an obvious economic disadvantage. Furthermore, the often arbitrary allocation of centralized investment funds places some farms at a technological disadvantage, which needs to be redressed.

By its very nature, a program that largely guarantees farm profitability, regardless of past performance, is going to have strong disincentive effects. In some cases, poorly performing farms have been able to attain higher average wage rates and profitability than neighboring well-run farms (109, 113). Channelling resources to high-cost producers means that the farm support programs do not minimize costs. Furthermore, farms categorized as low-profit and unprofitable have not taken the necessary steps to improve their performance. Most of the increased revenue derived from the price bonuses has been devoted to consumption rather than to investment (27). Overruns in wage expenditures have been occurring on many farms at the same time that defaults on payments to banks, suppliers, and the state budget have been increasing (15,

95). Partly as a result of the inability to improve efficiency of these farms, deferment on debt payments from agricultural enterprises to the State Bank recently has been extended through 1995 (58).

This set of support programs, particularly the price bonuses, has led to increased livestock production on financially weak farms. However, these resources would generate more growth in livestock production if they were invested in the most efficient farms. Furthermore, the support programs have probably contributed little to the effort to reduce average costs of production.

Organizational and Management Policies

Some policies are geared toward improving the way agriculture and related industries are organized and managed. These efforts include attempts to better integrate farm activity with other farms and support and processing enterprises, labor organization on the farm, policies toward the private sector, and better transportation management.

Improved Integration The weak standing of farms in relation to input and processing linkages is a major impediment to improved Soviet agricultural performance. Input suppliers feel no need to provide machinery, fertilizer, and other production resources in the variety or quality required by farms, or to hold back cost increases. The state procurement network traditionally has monopolized the purchasing and grading of agricultural commodities. Cooperation among farms at the local level has also been underdeveloped. The policies to alleviate these problems in recent years have been only marginally successful. The current approach continues the traditional strategy of perfecting organizational arrangements without seriously improving the incentives for farms, input and service providers, purchasers, and processors to better coordinate their operations.

In 1982, Soviet policymakers decided to implement a nationwide system of regional agro-industrial associations (RAPO's). These associations brought together farms, farm service organizations, procurement agencies, and processing plants located within the region. The RAPO's provided a forum for communication among the various organizations in agriculture and food production, but all of these organizations remained subordinate to their respective national ministries. As a result, the RAPO councils lacked adequate authority to implement their plans when these plans ran counter to the interests of particular ministries (43). The complicated system of farm prices impeded attempts by the RAPO's to facilitate greater integration among farms. Because the RAPO's were established

strictly along regional administrative boundaries, there was little flexibility for voluntary associations, especially when organizations were located in separate administrative regions.

In November 1985, the State Committee for the Agro-Industrial Complex (Gosagroprom) was formed in part to overcome the problems of the RAPO's. The Ministry of Agriculture, four other ministries, and one state committee were amalgamated into Gosagroprom (see box). In addition, three other ministries contributed parts of their organizations to Gosagroprom. All of the major farm input industries, however, including the machine-building ministries and the Ministry of Mineral Fertilizer Production remained independent of Gosagroprom.

By eliminating ministerial divisions, Gosagroprom could well improve planning coordination within the Soviet agro-industrial complex, though the exclusion of input industries does not augur well for improved linkages with farms. The amalgamation of former ministries into Gosagroprom does not solve the basic problem of conflicting interests among organizations. A possible advantage of Gosagroprom compared with the RAPO's is that these conflicts could be resolved more easily by order or directive from higher administrative levels. The reliance on interference from above, though, would represent a step backward in attempts to foster greater local initiative in improving integration.

Labor Organization In recent years, the Soviets have attempted to improve productivity in agriculture through better organization of labor. The implementation of the collective contract system of labor has been aimed at both improved responsiveness to changing local conditions and stronger ties between worker performance and remuneration. The basic notion of the collective contract has been that workers organize in small teams, which are assigned inputs and land by the farm management. The team agrees to produce specific commodities at prearranged prices, then determines how to use available resources and can adjust each worker's income based on that individual's contributions to production.

For a number of reasons, the collective contract teams generally have not functioned according to this simple concept nor have they achieved intended productivity increases. In practice, production results have been reflected only modestly in wage payments, and farm management often has failed to provide promised inputs and in other ways has violated team autonomy (7, 70, 108, and 112). Many teams have not established effective cost-accounting procedures to evaluate their performance and, according to one study, the typical

team has been too large to convince the individual worker that extra work effort will likely be rewarded (38).

Despite these problems, collective contract teams have had some positive effect on roughage-crop production. Roughage-crop production has been one of the lowest priorities for farm managers. At the times of year when farm labor has been short, particularly during the harvest of other crops, workers frequently have been pulled from roughage crop fields, resulting in untimely and poorly performed cultivating, harvesting, and storing of these crops. By assigning workers and inputs specifically to roughage crops, the collective contract system ostensibly eliminates or greatly reduces such transfers.

Since 1984, teams have become widespread in livestock production and now account for a third or more of cattle, hogs, and poultry in the socialized sector (41). It is too early to assess the positive effects of collective contract teams on livestock production. Problems to be overcome have included the needs to provide a reliable supply of feed, to adjust expected productivity based on the genetic quality of animals, and to improve the quality of housing and equipment that each team possesses.

Private-Plot Agriculture Official agricultural policy in recent years has stabilized private-plot production in Soviet agriculture. Two decrees, one adopted in 1977 and the other in 1981, were intended to reverse the decline in livestock inventories on private plots that occurred during the 1970's. The 1981 decree contains the most important new feature. It allows state and collective farms to count livestock products purchased under contract from private plots toward their own plan-fulfillment targets. Under this arrangement, the state or collective farm provides starter animals and

veterinary services, the private-plot operators provide labor and livestock housing, and both sides contribute to securing necessary feed supplies. The meat or milk produced is considered state or collective farm output. Soviet policymakers hoped that traditional conflicts over input supplies could thus be reduced.

A sweeping decree on agriculture published March 29, 1986, further enhanced the role of private plots in Soviet agriculture. Private plots can now sell livestock products under contract to the consumer cooperative network and have this output attributed to the sales plan for their respective state or collective farm (58). The decree also encourages increased sales of feed, other inputs, and services from state and collective farms to private-plot owners, and calls on state and collective farms to integrate targets for private plots into their annual plans. The state thereby hopes to increase livestock production and, more importantly, increase market supplies of livestock products. But the state provides no basis for monitoring or encouraging improved relations between private plots and the socialized sector.

It has been difficult to gauge the effect of official policies toward the private plot in recent years. According to official data, since 1980 animal inventories on private plots have generally stabilized, following the declines of the 1970's. Production of meat, eggs, and milk on private plots has indicated little positive effect from the new policies. But the reliability of these figures has been questioned because of the new contracting arrangements with state and collective farms. It is uncertain to what extent the increased production under contract has deflated official data for private-plot production. Between 1981 and 1984, milk sales under contract from private plots that counted toward socialized-sector production tripled, reaching 5 million tons (76). After adding this amount to data officially

Composition of the State Committee for the Agro-Industrial Complex (Gosagroprom)

<u>Former ministries within Gosagroprom</u>	<u>Ministries subordinate to Gosagroprom</u>	<u>Ministries cooperating with Gosagroprom</u>
Agriculture	Grain Products	Mineral Fertilizer Production
Food	Land Reclamation and Water Management	Tractor and Agricultural Machine Building
Meat and Dairy	Fish Industry	Machine Building for Animal Husbandry and Fodder Production
Fruit and Vegetables	State Forestry Committee	Machine Building for the Light and Food Industries
Rural Construction	Central Union of Consumer Cooperative	Microbiological Industry
State Committee for the Supply of Agricultural Production Equipment and Services		

attributed to private plots between 1980 and 1984, it appears as though milk production on private plots rose slightly rather than fell.¹⁰ The situation with meat production is also unclear, and it is quite possible that meat produced on private plots increased more rapidly between 1980 and 1985 than the official data indicate.¹¹

Despite official pronouncements in favor of expanded private-plot production, support is still less than wholehearted. Production of simple tools and equipment for private plots remains short of demand and production of small-scale machinery shows no significant improvement.

In the past few years, interest has focused on the Hungarian experience with private-plot agriculture. The U.S.S.R. has chosen not to follow the Hungarian example, though, in a number of important respects. First, not enough Soviet agricultural land has been devoted to private-plot feed production. In the U.S.S.R., less than 3 percent of arable land is in private plots, while in Hungary, private plots total more than 8 percent of arable land. Soviet state and collective farms have failed to meet contract obligations for the delivery of feed to private-plot livestock producers. Thus, Soviet private-plot livestock producers have been in a much more precarious position concerning feed than have been their Hungarian counterparts. Second, in Hungary, a separate organization for private-plot agriculture has participated in economic planning and has overseen the needs and interests of its members. Though calls for somewhat similar organizations for private-plot operators have been made in the U.S.S.R., they continue to be ignored (77). Third, opposition has remained in the U.S.S.R. to the large-scale subcontracting of livestock production that characterizes many private-plot operations in Hungary (29).

The generally favorable policy environment of the 1980's probably has fostered larger increases in private-plot livestock production than official statistics indicate. Because support for private-plot agriculture remains highly conditional, policy alone in this area is

¹⁰Adding 5 million tons of contract sales in 1984 to officially reported milk production on private plots of 23.5 million tons results in 1984 milk production of 28.5 million tons. This compares with 1980 private-plot milk production of 27.1 million tons (assuming no such contract sales in 1980). An article in *Sel'skaya zhizn'* (8/1/86) stated that milk production on private plots has stabilized at the level of 29 million tons per year, consistent with the above estimate, but far from the official data of 23–24 million tons.

¹¹Contract sales of livestock from private plots to state and collective farms exceeded 1 million tons liveweight in 1983. Because of the complicated intersectoral flows of animals between private plots and the socialized sector, it is more difficult to check official data concerning meat production than milk production. The possibility of the same downward bias in meat production data as in milk production data is distinct.

not expected to greatly increase livestock production in the foreseeable future.

Improved Transportation Losses in animal liveweight between farms and slaughtering or processing can reach 7–10 percent (8, 81). Reasons for these losses include excessive delivery distances, backups at slaughter plants during peak delivery times, inadequate milk refrigeration facilities, and improper pre-slaughtering maintenance at plants. Measures undertaken to reduce the losses between farms and processing have been touted as a cost-effective means of increasing consumer supplies of livestock products.

State and collective farms have not been adequately supplied with transportation equipment and have frequently used tractors for off-farm transportation. Since 1980, purchasing organizations have been responsible for an increasingly large share of milk and livestock transportation. In 1985, purchasing organizations provided transportation for nearly half of all state and collective farm livestock and milk sales (30, 110), more than double the shares for 1980. The rationale behind the shift in transportation burden has not been simply that purchasing organizations are better equipped to handle these responsibilities, but that by making purchases at the farm, purchasing organizations will show greater interest in reducing losses prior to slaughter or processing.

The shift in transportation burden away from farms has required substantial investment in road improvements, loading facilities, and milk refrigeration equipment on the farm. These measures may have helped to marginally improve the quality of milk and meat delivered from farms between 1981 and 1985.

Prospects for the Soviet Livestock Sector

Based on performance in the United States and Europe, current Soviet livestock inventories could produce much more meat and milk. To substantially realize this potential, Soviet livestock-sector operation must change significantly. The policies now in place or in the process of implementation portend improved performance compared with the late 1970's and early 1980's, but they will leave substantial productivity potential unrealized. Continued high costs in terms of labor, housing, feed, and other inputs are expected.

A preliminary assessment of the effect of the agricultural policies discussed above has indicated improvement in performance since 1982. Between 1982 and 1987, production of meat and milk grew more rapidly than during 1977–81, and per capita consumption of meat and milk, which stagnated or declined during 1975–82, resumed an uptrend in 1983–87.

Improvements in animal productivity during 1983–87 marked a notable reversal of the downtrends experienced between 1977 and 1982. Milk yields increased 3 percent per year after 1982, and per-head productivity of hogs and cattle increased 2 and 3.4 percent per year. Average daily weight gain and feed conversion efficiency, two important measures of production intensity, showed modest improvement through 1985, but improved noticeably in 1986.

Production costs of most livestock products on state and collective farms increased more slowly after 1982. The degree of slowdown, however, contrasted with official policy that called for the elimination of further cost increases.

Productivity advances in the Soviet livestock sector were particularly strong in 1986–87. Production costs of most livestock products either stabilized or declined in 1986 (data for 1987 are not yet available). The decision to increase protein feed imports certainly played an important role in the 1986–87 performance. The assertion of firm leadership by Gorbachev following his appointment as General Secretary in March 1985 also could have been an important factor. Similar agricultural growth spurts followed the consolidation of power by Brezhnev in the mid-1960's and Krushchev in the mid-1950's.

Prospects for Soviet livestock production hinge on how much the technical approaches, particularly improvements in feed supplies, will be pushed in coming years. A lack of coherence has continued to hinder the broad policies addressing pricing, farm finances, and agro-industrial integration. Without smoothing out their internal problems, these policies can accomplish little more than modest improvement in livestock sector performance.

Changes in labor organization and revised policies toward private plots have had a positive influence on trends in the Soviet feed-livestock sector in the last few years. If the proper incentives are introduced, the effect could be much more powerful. Family brigades, which are being discussed widely in the U.S.S.R., constitute an interesting innovation. Under this program, households or groups of households can voluntarily join as a labor team for work in socialized-sector crop or livestock production. This idea has been discussed mostly in the context of small settlements on state and collective farms and for farming in mountainous or marginal areas. The state wants family brigades to use older, small-scale livestock housing abandoned by state and collective farms during the livestock housing construction boom of 1965–80. Whether proper incentives and other prerequisites will be offered to the family brigades remains to be seen.

Improvements in feed supplies alone may prove adequate to realize planned livestock growth rates. Despite the recent upsurge in protein feed imports, more is needed to fully balance Soviet mixed feeds. The state mixed-feed industry also provides farms with protein concentrates for mixing with grain and other energy feeds. Production of such protein concentrates could stand to increase significantly for Soviet livestock intensification to be successful.

Improvements in the ration mix will allow the Soviets to produce more livestock products from a given amount of feed. But given current inefficiencies in the feed-livestock sector, these improvements will have to be systematic and integrated with broader changes in agricultural system operation to be fully effective. For example, increasing protein supplies alone will not have the full beneficial effect if feed rations remain strikingly inadequate for other components, such as vitamins and minerals, and if feeding practices and animal care remain short of optimum.

What effect will the current livestock policies have on Soviet grain feeding? The larger protein feed imports should limit grain feeding. However, there is good reason to suspect that grain feeding in the U.S.S.R. will continue to increase. The Soviets began in 1978 to substitute roughages for grain in cattle rations. Between 1978 and 1984, the amount of grain fed in the U.S.S.R. declined, and the quality and quantity of roughage feeds improved. Given the increase in livestock production in 1978–84, this substitution of roughages for grain represented a savings of millions



Beef cattle constitute less than 5 percent of total cattle inventories in the U.S.S.R. Significant expansion of beef cattle numbers could factor greatly in achieving meat production targets.

of tons of imported grain. The shift to roughages also improved milk yields, but only modestly slowed production cost increases for beef and milk, and caused little or no improvement in feeding efficiency or cattle slaughterweights. Soviet roughage feed production will likely increase further in the next few years, but Gorbachev's intensification strategy may require renewed emphasis on grain in cattle rations. Grain feeding increased in 1985 and 1986 and contributed to the 1986-87 upturn in livestock sector performance.

Prospects for grain feeding, and for grain imports, will largely depend on how fast livestock production increases. Also, the amount of savings, resulting from increased protein availability, in the grain feeding requirements of hog rations that will be countered by increased grain feeding to cattle will be another factor. The U.S.S.R. is reasonably close to attaining 1990 plan targets for meat and milk, while the egg production goal has been attained (table 18).

Meat production must increase 3.6 percent per year in 1988-90 to attain the 1990 target of 21 million tons. Milk production must increase 0.7-2.0 percent per year to reach the target of 106-110 million tons in 1990. These growth rates are lower than those achieved in 1986-87. The strategy for livestock growth calls for increased per-head productivity and virtually no increase in inventories (48, 64).

According to E. Sizenko, Deputy Chairman of Gosagroprom, "meat production will increase quickly for beef, but for pork and poultry, more slowly. Grain for pork and poultry remains in short supply. After a level of self-sufficiency, the production level of 250 million tons of grain, is reached, it will be possible then to intensify all branches of livestock raising" (1).

The desire to emulate Western standards of diet quality will factor greatly in future Soviet livestock growth. Probably more important under Gorbachev is the goal of reducing market shortages for meat, milk, and milk products. The role that retail price increases might

play in solving this problem is questioned. Retail prices for livestock products will be increased before 1991. The size of these increases remains unknown. Gorbachev has noted the problems of excess food demand, the growing burden of retail price subsidies, and the low relative prices for food in the U.S.S.R. compared with Western nations (57). One plan under consideration calls for the elimination of retail food price subsidies, which would mean a doubling (or more) of most livestock product prices. Under this plan, consumers are compensated through income supplements (104). This is basically the policy implemented under martial law in Poland in 1982. Polish meat prices in 1982 increased 240 percent and consumers were partially compensated through income supplements. Excess demand for meat was greatly reduced, but at a heavy political cost.

Can the Soviets follow the Polish strategy? An important criterion will be whether Soviet consumers perceive themselves as better off with a new price policy. Soviet consumers have indicated little willingness to trade the inconvenience of lines and unavailability of meat for higher prices. This suggests that potential Soviet retail price increases will be less sweeping than they have been in Poland, and will have a more modest effect on eliminating excess consumer demand.

Gorbachev has devoted great attention to trimming the relatively high prices charged at collective farm markets, indicating an acute political sensitivity to the price issue. Thus, elimination of price subsidies, with or without full income maintenance, appears to be highly problematic. Development of a multitiered pricing system might be more likely. Under this system, prices of basic cuts sold in state stores would be maintained, while an increasing share of meat and meat products would be sold at higher prices, either in consumer cooperative stores (this has already begun) or in the state retail network itself.

Soviet livestock expansion will depend on hard currency availability and import prices for grain, oilseeds, and oilseed meal. Lower petroleum prices since 1985 have reduced Soviet hard currency earnings and increased Soviet hard currency debt. Major reductions in prices paid by the U.S.S.R. for agriculture commodities over the same period have softened the effect of the hard currency squeeze on the volume of agricultural imports.

The State considers the attainment of meat consumption goals to be more important than meat production goals. As long as meat is available on a bilateral trade basis from Eastern Europe and elsewhere, or at bargain prices from hard currency sources, such as the European Community (EC), meat imports will likely

Table 18—Actual and 1990 planned production of major livestock products

Year	Meat ¹	Milk	Eggs
	----- Million tons -----		Billions
1970	12.3	83.0	40.7
1975	15.0	90.8	57.4
1980	15.1	90.9	67.9
1985	17.1	98.6	77.3
1987 ²	18.9	103.7	82.1
1990 (Plan)	21.0	106-110	80-82

¹Slaughterweight.

²Preliminary.

Source: (91).

continue to supplement domestic production. Given the relative inefficiencies of Soviet feeding, importing meat makes sense. Even the consumption goals, though, are negotiable if the costs necessary to achieve them are too high. Improvement in the supply of high-quality foods to a level still below the planned target may be considered sufficiently good performance.

The outlook for the Soviet livestock sector in the 1990's suggests more rapid growth than during the doldrums of the late 1970's and early 1980's, but not as rapid as in 1986-87. There is tremendous potential for improvement, but over the longer term, this potential will be difficult to realize without systemic changes in Soviet livestock production. These changes would include: (1) an increased role for flexible prices as a way to improve resource allocation, including a reduction of administrative interference in inter-enterprise dealings, (2) closer coordination between wage payments and labor productivity, (3) increased specialization of livestock production on the more efficient farms and the lower cost regions of the country, (4) greater responsiveness of input and service suppliers to farm needs, (5) improved technical training of the workforce and closer ties between scientific-technical advances and the farms, (6) increased incentives for farm management to improve performance through increased rights to retain profits on the farm, and (7) elimination of bail-outs for unprofitable livestock operations.

Current Soviet policies address most of these considerations, but suffer from numerous shortcomings. As a result, production costs will likely continue to increase and livestock production in the U.S.S.R. will continue to require a large share of Soviet labor and investment resources. The expected payback from this effort will be a gradual improvement in the diet and, depending on price and income policies, possibly a slight slackening of excess consumer demand.

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